Frontenac Institution Lands Planning Study

Environmental Project Course
School of Urban and Regional Planning
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Executive Summary

Figure S.1 – (Left) North-east corner of Frontenac Institution Lands looking south over wetland. (Right) South-west corner of the Frontenac Institution Lands looking north-east toward penitentiary (Authors' Collection)

The Frontenac Institution Lands Planning Study is a report intended to provide a leading edge sustainability plan for the Frontenac Institution lands, in the event that they become available for non-penitentiary purposes. The study presents two concept plans that reflect specific sustainability objectives and build upon the goals of Kingston's Adopted Official Plan and the outcomes of a stakeholder workshop, while addressing the unique characteristics of the site.

Located in the urban boundary of the City of Kingston, the Frontenac Institution Lands consist of 338 hectares of land currently operated by the Correctional Services of Canada as a penal farm. The amalgamation of the City of Kingston and two adjacent townships, situated the Frontenac Institution Lands at the centre of the newly created urban boundary. Its diverse landscape consists of prime agricultural lands, forest, wetlands and floodplains, which have persisted for years even as the urban fabric developed around it.

The Frontenac Institution Lands are subject to a number of complex legislation and policies. Currently, Correctional Service of Canada (CSC), a custodial department of the Federal Government, owns the Frontenac Institution Lands, and if divested, the uses of these lands could be constrained by decisions made by the Canada Lands Company. The land uses upon this site will also need to adhere to regulations within the Planning Act (1990), the Provincial Policy Statement (PPS 2005), Ontario's Endangered Species Act (2007), and the City of Kingston's Official Plan (2009).

In addition to extensive background research, the study's findings and recommendations have been informed by an international scan of precedent environmental case studies and an informal stakeholder workshop. Out of these activities, two possible concept plans were developed for the site.

The Green Communities Plan

Vision of leading edge green residential community integrated with environmental restoration objectives that facilitate interconnectedness between our natural systems, food systems, and community to further sustainability goals of the City of Kingston.

Design

- Provides 7,500 housing units (56% of Kingston's projected housing needs until 2026)

	• Builds on the existing infrastructure, transit service hubs and proximity to major commercial and employment centers • Protects the sensitive ecosystem from negative impacts through buffer systems • Decreases reliance on the automobile through trails, cycling pathways, walkability and increased transit service • 35% of lands dedicated to residential and local commercial uses, including affordable housing • 60% of lands as a combination of protected areas, agriculture in the form of community gardens, and open space • Remaining lands devoted to community facilities, including a new education centre, recreation centre, and elementary school
Highlights	• Emphasis on access, connectivity, and alternative modes of transportation • Green building design • Edible landscaping and community gardens • Stormwater management and greywater recycling • Enlarged and enhanced protected areas • Low impact design in road extensions • New community facilities, including an education centre, recreation centre, elementary school, and soccer field
Implementation Tools	• Community partnerships for trail maintenance, environmental monitoring, non-profit housing and green technology training • Financial tools such as leasable community space, sustainability design criteria, development charge rebates, and a green building fund • Special policy area, zoning, or site plan control

The Agricultural Conservation Plan

Protect prime agricultural land while enhancing the well-being of the site's natural systems and surrounding communities to further the sustainability goals of the citizens of Kingston and protect its cultural heritage.

Design	• Maintains and improves on-site agriculture for local food production and security • Minimizes impacts on natural areas and restores existing wetlands • Provides 1,750 housing units (13% of Kingston's projected housing needs until 2026) • Preserves and protects Kingston's farming heritage • 50% of lands dedicated to agriculture, which include organic farming, husbandry, research farms, and community gardens • 44% of lands preserved as protected area and open space • 5% of lands dedicated to residential, with one third of the housing as affordable • Remaining lands devoted to community facilities, including an education centre, recreation centre, and agriculture support facilities
Highlights	• Eco-agriculture approach • Open space, community gardens and agricultural education center

- Increased site access for recreational purposes
- Promotion of on-site tourism
- Enlarged and enhanced protected areas
- New community facilities, including an education centre, recreation centre, cannery, freezing centre, incubator kitchen and farmers' market

Implementation Tools

- Special policy area
- Cultural heritage landscape designation
- Community partnerships such as community supported agriculture, a farming collective, or agricultural education
- Financial tools, including government programs, corporate sponsorship, agricultural tourism, and residential development sales to support community schemes

The concepts are evaluated against two professionally accepted evaluation tools, the Leadership in Energy and Environmental Design for Neighbourhood Development (LEED ND) Project checklist and the Southlands Project Evaluation Tool, and are also evaluated against the study's guiding principles. Looking at all three evaluations affirms that the concepts work in a complex harmony with the site to advance principles of sustainability. Though both projects differ widely as to how the land is used they share a number of similarities. These similarities form the basis for our recommendations.

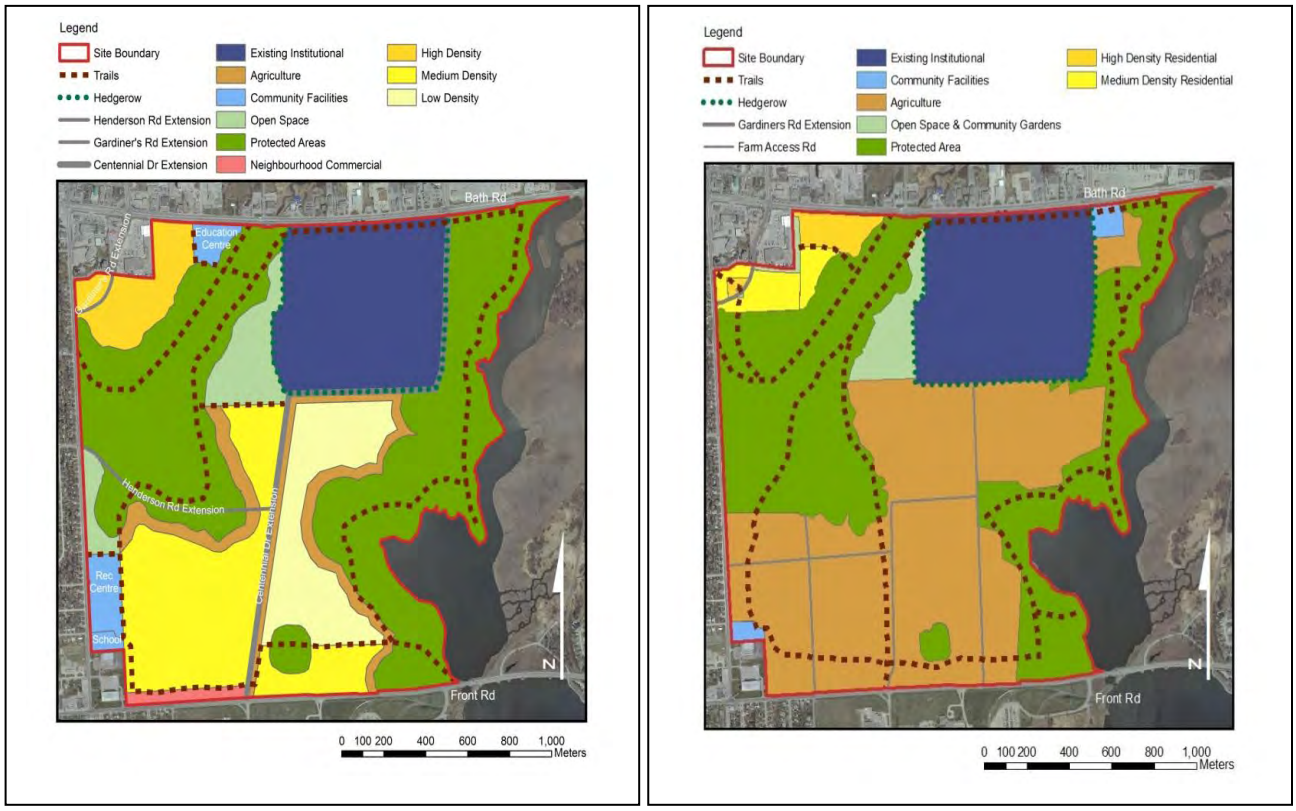

Figure S.2 – Maps Outlining the Green Communities (left) and Agricultural Conservation (right) Concept Plans

Summary of Recommendations

The Green Community Plan and Agricultural Conservation Plan demonstrate how different features could be incorporated on the site, and reflect how different land uses may work together. The size and scale of the lands allows for many different approaches that could further the sustainability goals of the City of Kingston, and the achievement of these goals are not limited to the two concept plans presented. However, certain common themes emerged from both concepts, and based on these themes and input from our stakeholder workshop, we feel that the following ideas would help move any sustainable use forward:

Natural Area Protection	1. Prioritize the protection and restoration of the wetland and floodplain, and create natural buffers between it and other site uses 2. Enhance the wetland's habitat value by connecting the east and west protected areas
Urban Intensification	3. Provide high and medium density housing to accommodate some of Kingston's population growth, targeted in the northwest corner of the site 4. Design buildings that reduce energy needs through passive solar orientation, low energy building materials, efficient appliances, and on-site energy generation 5. Implement greywater recycling and natural stormwater management techniques to reduce the site's water needs and impact on the wetland
Urban Agriculture	6. Integrate an approach that promotes agricultural productivity, environmental integration, and financial stability 7. Foster a sense of community through shared community gardens and farm-support facilities, such as an incubator kitchen and cannery 8. Promote urban farmland as a reflection on Kingston's history and cultural heritage landscapes
Community Connections	9. Integrate the site with the surrounding community through partnerships, site design, and community facilities 10. Develop a passive, ecologically sensitive trail system along the site's perimeter and outside protected areas to facilitate healthy communities and recreation

Next Steps

1. Initiate dialogue on how the possibility of a change in ownership of the Frontenac Institution Lands allows for the exploration of opportunities.
2. Engage the stakeholders and surrounding community if the lands become available. A steering committee or liaison group would aid in ensuring transparency and enhanced community involvement.
3. Create a special policy area for the site that addresses its unique nature and prioritizes sustainability and innovation.
4. Create partnerships that further the development and guidance of different site uses.
5. Begin studies, such as an environmental monitoring program, as early as possible.

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1.0 Introduction to the Frontenac Institution Lands

1.1. FRONTENAC INSTITUTION LANDS AT A GLANCE

The Frontenac Institution Lands are a 338 hectare parcel of land currently operating as a penitentiary farm under the mandate of the Correctional Service of Canada (CSC). The lands are bordered by Bath Road to the north, Front Road to the south, Days Road to the west, and Little Cataraqui Creek to the east. The 1998 amalgamation of the City of Kingston, Pittsburgh Township, and Kingston Township situated the site at the centre of the newly-created area. Its diverse landscape includes prime agricultural lands, forest, wetlands and floodplains, which are now surrounded by the urban fabric that has developed around it.

The Government of Canada has announced that penitentiary farms may close, and it is possible that some of the Frontenac Institution Lands may be declared surplus. The area has been identified as a possible site for development, should the lands become available, in Kingston's Urban Growth Strategy (2004). The site is also valued for its natural characteristics including its forests and wetlands and its prime agricultural lands. Due to its urban location and size the Frontenac Institution Lands hold enormous potential to contribute to a more sustainable future for the City of Kingston.

Figure 1.1 below illustrates the Frontenac Institution Lands (delineated on left) as it relates to the city of Kingston's downtown (delineated on right). The scale of the study area should be noted.

Figure 1.1 – Delineation of scale and location, Frontenac Institution Lands (Google Earth, 2008)

1.2 OVERVIEW OF THE PROJECT

1.2.1 Purpose and Objectives

The City of Kingston has a vision of becoming one of the most leading edge sustainable cities on the continent. In the event that the Frontenac Institution Lands become available for non-penitentiary use, our focus is to develop two concept plans of how that sustainable vision could be realized. Both plans integrate a wide range of background research and existing site analysis, to explore potential options for the site

Our project is a partnership with the Cataraqui Region Conservation Authority (CRCA). The CRCA works with multiple levels of government, the community, organizations, and businesses to ensure those involved in planning and program delivery protect watersheds and water supply for future generations. The CRCA's 2020 vision statement states,

> "Our vision is that the natural environment of the Cataraqui Region Conservation Authority watersheds will be conserved, that degraded natural resources will be restored, that our regional diversity will be valued by the watershed residents, and that the public will understand the role that everyone needs to play in resource management and resource enjoyment." (CRCA, 2002)

The CRCA's key principles for planning include an ecological approach to watershed planning, sustainable development, stewardship of the land, public education, partnerships and cooperation, and consideration of the cumulative impacts of development. As such, their goal in the study of the Frontenac Institution Lands is to encourage a constructive dialogue on the long term planning possibilities for the area.

1.2.2 Outline

The first chapter outlines the site, the study, and the study's guiding principles. Chapter 2 reviews the relevant legislation and policies. Chapters 3 and 4 synthesize background information and first-hand observation to describe the site's land uses, transportation, demographic and market conditions, and environmental conditions. Chapter 5 outlines the results from an international environmental scan on urban sustainable development.

Two concept plans were developed based on an initial stakeholder workshop. These plans reflect specific sustainability objectives and build upon the goals of the Adopted OP, while addressing the unique characteristics of the Frontenac Institution Lands. Both plans guide development in conjunction with Ontario's provincial statutes and Kingston's municipal regulations. Chapters 6 and 7 outline their vision, approach, design, and implementation tools and strategies. Chapter 8 evaluates the plans, and Chapter 9 makes final recommendations and conclusions.

1.2.3 Data Collection Methods

We examined the ecological, social, cultural and economic factors surrounding the site. The research process was informed by secondary research in the form of reports, government policy and documents, technical manuals, and Kingston's new Adopted Official Plan alongside first-hand observation, GIS mapping and stakeholder consultation.

1.3 SUSTAINABILITY STATEMENT

Sustainability is increasingly used as a foundation for urban growth strategies in an effort to preserve and enhance the environment, while planning for cultural vitality, economic well-being and social equity. The most common definition of sustainable development is from the United Nations Brundtland Commission, which defined it as "meeting the needs of the present without compromising the ability of future generations to meet their needs," (World Commission on Environment and Development, 1987). Sustainability has taken a prominent place within the City of Kingston's corporate image and growth strategies. "Enough, for all, forever" is the aim of the City of Kingston in achieving sustainability. The city's goal to become Canada's most sustainable city reflects their "desire to foster a sense of stewardship, community resilience, and self sufficiency, now and in the future," (Adopted Official Plan, 2009).

The City of Kingston uses a four-pillar approach (see Figure 1.2 below) to define sustainable communities. Their four pillars encompass cultural vitality, economic health, environmental responsibility, and social equity, while encouraging learning and education (City of Kingston, 2009). These four pillars represent the integrative and interconnected processes that must underlie sustainability. They reflect the interconnection of human and ecological systems and how they each, in tandem, play a role in creating a sustainable community. A sustainable approach is generally associated with complex and interacting systems (Gibson, 2006). The concept plans outlined within this report aim to align with the City of Kingston's vision to be the most sustainable city in Canada.

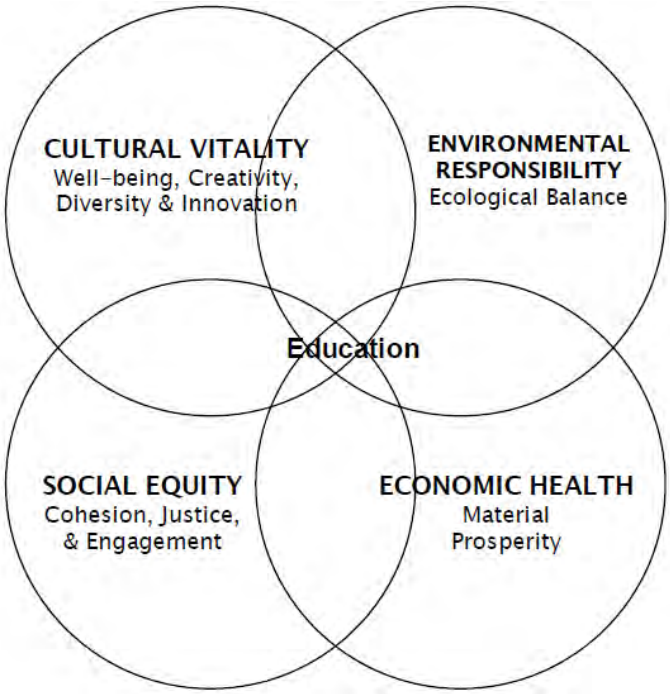


Figure 1.2 – 4 Pillar Approach to Sustainability (CECC, 2006)

1.4 GUIDING PRINCIPLES

The purpose of this study is to develop a leading edge sustainability plan outlining options for change on the Frontenac Institution lands, should it be released from federal ownership. In order to achieve this result, guiding principles were developed to direct the research and suitability of the concept plans. The guiding principles listed below were chosen by the research team based upon Kingston's four pillar approach to community sustainability and are intended to ensure any options for the site fit within Kingston's desire to become the most sustainable city in Canada.

Ecological

- ✓ Preserve and enhance the local ecosystems
- ✓ Ensure integration of land uses with existing natural features
- ✓ Ensure energy and water efficiency, reduced CO_2 emissions and promote stewardship of local resources
- ✓ Promote and facilitate the use of alternative forms of transportation

Social

- ✓ Create complete, mixed use land use design that is consistent with the needs of the Kingston area
- ✓ Ensure the availability of a variety of housing choices
- ✓ Promote healthy lifestyle choices through responsible design
- ✓ Ensure connectivity with surrounding community
- ✓ Promote community partnerships

Economic

- ✓ Provide opportunities for sharing resources
- ✓ Financial feasibility of the plan
- ✓ Entice visitors from outside the immediate community
- ✓ Contribute to Kingston's economic development and growth

Cultural

- ✓ Acknowledge and integrate the history and heritage of the site
- ✓ Respect sense of place
- ✓ Provide opportunities for growing and promoting local, sustainable sources of food
- ✓ Ensure opportunities for creative expression

2.0 Policy Framework

This section describes the provincial legislation, and municipal and federal guidelines that apply to the Frontenac Institution Lands. This policy review informs the concept development and recommendations of the planning study. More specific policy measures are discussed in Chapters 6 and 7 in relation to the different concepts.

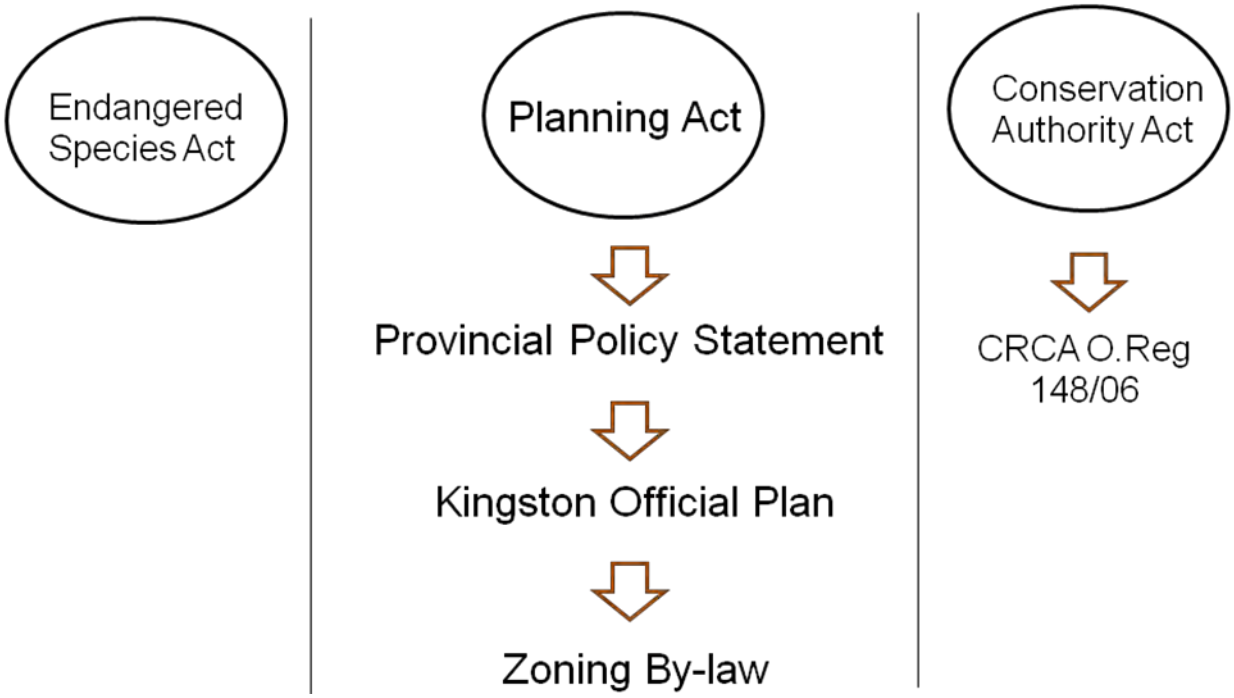


Figure 2.1 – Relevant Policy investigated for land use changes on Frontenac Institution Lands

2.1 FEDERAL GUIDELINES

Currently the Frontenac Institution Lands are owned by Correctional Service of Canada (CSC), a department of the Federal Government. Given this project is acting under the assumption that the lands will be off-loaded by CSC, their divestment policies are considered to determine where the alternate ownership would fall.

If the CSC disposed of the lands themselves, under the Treasury Board's Policy on the Disposal of Surplus Real Property, the Frontenac Institution Lands would likely be a "Strategic Disposal."

> *"Surplus real properties subject to strategic disposal are properties or portfolios of properties with potential for significantly enhanced value, those that are highly sensitive, or a combination of these factors. Because of the complexity associated with these properties, they may require innovative efforts and a comprehensive management approach to move them into the market."* (Treasury Board of Canada Secretariat, Section 5.2)

The Canada Lands Company (CLC) disposes of this type of property, and goes through a development process which includes analysis, acquisition, consultation, visualization, preparation, and finally development (or sale to other builders). Given that the CLC would be dealing with the disposal of these lands, their objectives would need to be considered (Treasury Board of Canada Secretariat, Section 3.0):

a. efficiency, equity, fairness, and transparency in disposals;
b. consideration of the interests of communities and other levels of government;
c. the best value to the Canadian taxpayer; and
d. consideration of all relevant government policy and other strategic concerns of government.

To summarize, if the CSC were to dispose of the Frontenac Institutiol Lands, they would likely be considered a "strategic disposal," which allows for innovation, but is also bound by accountability to achieving the best value for the Canadian taxpayer.

2.2 PROVINCIAL GUIDELINES

2.2.1 Planning Act

The *Planning Act* sets out the formal planning process for land use planning in Ontario and describes how and by whom land uses may be controlled. The *Planning Act* is legislation that provides the basis for the preparation of Official Plans, and other policies and tools to guide future development in Ontario (Ministry of Municipal Affairs and Housing, 2009).

Section 1.1 of the *Planning Act* outlines its purpose as:

> (a) to promote sustainable economic development in a healthy natural environment within the policy and by the means provided under this Act;
> (b) to provide for a land use planning system led by provincial policy;
> (c) to integrate matters of provincial interest in provincial and municipal planning decisions;
> (d) to provide for planning processes that are fair by making them open, accessible, timely and efficient;
> (e) to encourage co-operation and co-ordination among various interests;
> (f) to recognize the decision-making authority and accountability of municipal councils in planning. (*Planning Act*, R.S.O. 1990, c.P13, s. 1.1)

The *Planning Act* outlines that provincial and municipal decision makers in planning must have regard to a number of elements relevant to the study site. These include the protection of ecological systems, the protection of agricultural resources, the conservation of features of significant cultural, historical or scientific interest, the efficient use and conservation of water and energy, the minimization of waste, the orderly development of safe and healthy communities, the adequate provision of educational, social and recreational facilities, the adequate provision of a full range of housing, the coordination of planning activities of public bodies, the appropriate location of growth and development and the promotion of development that is designed to be sustainable, to support public transit and to be oriented to pedestrians (*Planning Act*, R.S.O. 1990, c.P13, s. 2.0). These

elements were regarded throughout the study process in order to help frame the resulting concept plans.

2.2.2 Provincial Policy Statement

The Provincial Policy Statement (PPS) is issued under the authority of the Ontario *Planning Act*. It provides direction on matters of provincial interest related to land use planning and development. All policy decisions that are under provincial jurisdiction, including municipalities, must be consistent with the PPS as stated in Section 3 of the *Planning Act*. It is intended to be a foundation, and complemented by provincial plans and local policies. It provides minimum standards that plans must adhere to or improve upon.

Its vision for Ontario's land use planning system is to promote strong communities, a clean and healthy environment, and a strong economy, whereby long-term prosperity takes precedence over short-term considerations. The PPS promotes a policy-led planning system that recognizes complex inter-relationships among and between environmental, economic and social factors in long-term land use planning and provides guidance as to how to achieve this.

The PPS outlines a number of policy directions that are relevant to investigating changing use of the Frontenac Institution Lands. The following sections were taken into account in the development of the project concepts:

- 1.0 Building strong communities in order to ensure Ontario's long-term prosperity, environmental health and social well-being through management of change and efficient land use and development patterns.
- 1.1.1(a)(b)(c)(d)(e)(g) Healthy, liveable and safe communities sustained by a mix of residential, employment, recreational and open space uses to meet long-term needs, avoiding development and land use patterns which may cause environmental or public health and safety concerns, avoiding development and land use patterns that would prevent the efficient expansion of settlement areas, promoting cost-effective development standards to minimize land consumption and servicing costs, and ensuring that necessary infrastructure and public service facilities are or will be available to meet current and projected needs.
- 1.1.3.2 Explains that land use patterns within settlement areas shall be based on efficient use of land and resources, infrastructure and service facilities, and minimizing negative impacts to air quality and climate change.
- 1.1.3.7 New development taking place in designated growth areas should occur adjacent to existing built-up area and shall have a compact form, mix of uses and densities that allow for the efficient use of land, infrastructure and public service facilities.
- 1.2 emphasizes the need for coordination, integration and a comprehensive approach to dealing with planning matters.
- 1.4 Provide for an appropriate range of housing types and densities.
- 1.5.1 Healthy and active communities are also promoted through the provision of a full range and equitable distribution of publicly-accessible built and natural settings for recreation, including facilities, parklands, open space areas, trails and, where practical, water-based resources.
- 1.6.1 States that infrastructure and public service facilities shall be provided in a coordinated, efficient and cost-effective manner to accommodate projected needs.

- 1.6.2 Promotes planning for infrastructure and public service facilities be integrated into planning for growth.
- 1.6.5.1Encourages transportation systems to be safe, energy efficient and facilitate movement of people and goods.
- 1.6.5.4 Land use patterns, densities and mix of uses should be promoted that minimize the length and number of vehicle trips and support the development of viable choices and plans for public transit and other alternative transportation modes
- 1.6.8.1 Waste management systems need to be provided that are of an appropriate size and type to accommodate present and future requirements, and facilitate, encourage and promote reduction, reuse and recycling objectives.
- 1.7.1(e) and (g) Long term economic prosperity should be supported by designing sensitive land uses appropriately, buffered and/or separated from each other to prevent adverse effects and promoting the sustainability of the agri-food sector by protecting agricultural resources and minimizing land use conflicts
- 1.8.1(a), (b), and (e) Planning authorities shall support energy efficiency and improved air quality through land use and development patterns which promote compact form and a structure of nodes and corridors, promote the use of public transit and other alternative transportation modes, and promote design and orientation which maximize the use of alternative or renewable energy, such as solar and wind energy, and the mitigating effects of vegetation.
- 2.1.1 Natural features and areas shall be protected for the long term
- 2.1.3 Development and site alteration shall not be permitted in significant habitat of endangered species and threatened species
- 2.2.1(c) Planning authorities shall protect, improve or restore the quality and quantity of water by identifying surface water features, ground water features, hydrologic functions and natural heritage features and areas which are necessary of the ecological and hydrological integrity of the watershed.
- 2.3.1 Prime agricultural areas shall be protected for long-term use for agriculture.
- 2.6.1Significant built heritage resources and significant cultural heritage landscapes shall be conserved.
- 3.1.1(b) Development shall generally be directed to areas outside of hazardous lands adjacent to river, stream and small inland lake systems which are impacted by flooding hazards and/or erosion hazards[1]

As can be seen from the above policies, concept planning for the Frontenac Institution Lands requires a number of considerations. The PPS strives to increase sustainability in land use planning and gives equal weight to different approaches to achieve this.

[1] Adding to this, the wetland portion of the site is considered a Provincially Significant Wetland, and according to the Provincial Policy Statement, no development is allowed within the wetland, while adjacent areas require a 120 metre buffer (Ministry of Natural Resources, 2009). The PPS offers additional support to species at risk found in the area, and does not permit development on areas that are considered significant habitat of endangered or threatened species (Ministry of Natural Resources, 2009).

2.2.3 Cataraqui Region Conservation Authority Regulation Ontario Regulation 148/06 Cataraqui Region Conservation Authority: Regulation of Development, Interference with Wetlands and Alterations to Shorelines and Watercourses

The policies of the CRCA are within the mandate of Ontario Conservation Authorities Act and support the vision, goals and objectives of the Cataraqui to 2020 strategy. They serve as an internal guide to review planning documents and development applications as outlined in the Ontario Planning Act. The Conservation Authorities Act (CAA) states that each Conservation Authority (CA) must establish and undertake within its jurisdiction, *a program that furthers the conservation, restoration, development and management of natural resources*. (Government of Ontario, 1990).

The Act also specifies that authorities have the power to administer a regulation, "prohibiting, regulating or requiring the permission of the authority for straightening, changing, diverting or interfering in any way with the existing channel of a river, creek, stream or watercourse, or for changing or interfering in any way with a wetland; and development if, in the opinion of the authority, the control of flooding, erosion, dynamic beaches or pollution or the conservation of land may be affected by the development," (Section 28.1(b) and (c)).

The CRCA and its supporting legislation demonstrate the importance of the CRCA in any redevelopment of the Frontenac Institution Lands. Given the presence of floodplains, and significant wetland habitat, the CRCA's mandate implies conservation, restoration and careful management of natural resources on the subject lands.

2.3 MUNICIPAL GUIDELINES

The City of Kingston is currently waiting to finalize a draft Official Plan (OP) adopted by council, which was developed with substantial public consultation (referred to as Adopted Official Plan). They are awaiting a final decision from the Ministry of Municipal Affairs and Housing (MMAH). The Adopted OP outlines a long-term vision for Kingston through to 2026. Kingston's Adopted OP emphasizes the need for sustainable development over the course of the plan and has incorporated recommendations from a multitude of background studies completed since amalgamation.[2]

The Adopted OP presents a number of approaches to achieve sustainable development goals, including:

- conserving natural and built resources;
- reducing pollution and rehabilitating polluted areas;
- applying conservation practices;

[2] Focus Kingston, 2000; Population and Growth Trends Model; Downtown Action Plan, 2003; Cycling and Pathways Study, 2003; Kingston Transportation Master Plan, 2004; City Owned Industrial Land Development Strategy, 2005; Natural Heritage Strategy, 2006; Regional Commercial Study Update, 2006; Waterfront Strategy (Background Report), 2006; Agricultural Study, 2007; Downtown and Harbour Architectural Guidelines Study, 2007; Kingston Model for Affordable Housing Development, 2004; and, Urban Growth Strategy, 2005.

- reducing energy consumption; and
- arranging and phasing land uses in a manner that reduces the consumption of land and energy and prevents premature public spending.

The Adopted OP serves as a framework from which Kingston's citizens and business owners can learn about and implement sustainability. These actions will encourage Kingston's transformation into a model sustainable city and contribute to the reduction of climate change. The goal of the Adopted OP's strategic direction is:

> *"To protect, conserve, and strategically deploy the natural, cultural and built resources of the City in a manner that promotes compatibility between different functions; that reduces energy, land or resource consumption in order to reduce greenhouse gas emissions with the objective that all new buildings are carbon neutral by 2020; that encourages sustainable forms of energy production and the use of cultural heritage resources to benefit the public good; that limits the need for undue extension of infrastructure or reliance on the private automobile; that fosters local sources of food which are sustainable; and promotes programs and practices that will produce increasingly sustainable development in the City." (City of Kingston, 2009)*

The plan supports this ambitious goal through various strategies such as protective designations of environmentally sensitive areas and prime agricultural land, addressing urban growth pressures within the urban boundary, reducing energy consumption, and encouraging land use patterns and densities that reduce land consumption and are transit supportive.

The Frontenac Institution Lands are currently designated and zoned institutional and are considered a "Special Planning Area" for growth consideration in the Adopted OP. The concept sections 6.0 and 7.0 address specifics within Kingston's Adopted Official Plan as it relates to the Frontenac Institution Farmlands.

2.4 CONCLUSIONS

All of the above Provincial and Municipal documents have a strong emphasis on increasing sustainability within Kingston's urban boundary. Kingston's Adopted OP reflects this growing focus on sustainability by incorporating sustainable development objectives throughout the plan. This study will be working within the parameters of the above documents for recommended concept plans and their implementation.

3.0 Existing Site Conditions

This chapter will outline the site conditions of the Frontenac Institution Lands to describe the current state of the community and provide a foundation for the sustainable concept plans presented. A wide variety of background information has been synthesized, including first-hand observation, scientific reports, City of Kingston documents, Cataraqui Region Conservation Authority (CRCA) resources and other government documents.

3.1 BRIEF HISTORY OF THE SITE

Historic documents indicate that the site was initially forested, but has since been converted for agricultural, urban, and potential industrial uses (KFN, 2004). Agricultural activity in the region pre-dates the arrival of Europeans. The arrival of Loyalist settlers in Kingston after the American Revolution resulted in the division of lands in 1783 into the Kingston Township, whereby clearing of lands for agricultural purposes, and cultivation of soil to grow crops and pasture livestock took place. In 1793 Bath Road was constructed linking Kingston to Collins Bay (Patterson, 1985).

The Government of Canada purchased parcels of land south of Bath Road in 1930, 1931, and 1958. In 1930, the lands were to be used by Correctional Service of Canada, to build the Collins Bay Institution, a medium security prison that is now noted for its impressive architectural design and located within the Frontenac Institution Lands (Correctional Services of Canada, 2009).

From the 1940s to the 1960s various agricultural facilities were erected and a separate minimum-security facility was established known as the Collins Bay Farm Annex. The Annex was renamed the Frontenac Institution in 1975. As of 2004, 240 hectares were being used for farming. Agricultural uses on the site included dairy cows, laying hens, field crops to support the livestock, and the composting of solid manure (KFN, 2004). A site visit in 2009 noted a large number of corn fields.

A small portion of the site on the south side of the property was given to the Cataraqui Region Conservation Authority in 1966 for conservation purposes, and is subject to a covenant limiting non-conservation uses (KFN, 2004). As of 1954, the DuPont Company of Canada owned a small piece of property north of Front Road adjacent to Little Cataraqui Creek. In 1991, they donated the lands to the Cataraqui Region Conservation Authority (KFN, 2004).

For many years, the Frontenac Institution Lands were a part of the rural area outside of Kingston. During the 1950s, Kingston's population growth resulted in an expansion of housing around the Frontenac Institution lands (see figure 3.1 for a 1951 aerial depiction of the lands and surrounding agriculture). The amalgamation of the City of Kingston, Pittsburgh Township, and Kingston Township in January of 1998, situated the Frontenac Institution Lands at the centre of the newly created urban boundary (KFN, 2004).

Figure 3.1 – Historic 1951 aerial photo showing agriculture uses surrounding the Frontenac Institution Farmlands (CRCA Collection)

3.2 CURRENT LAND USES

3.2.1 Community Facilities

Sitting on the southwest corner of the lands, at the intersection of Days Road and Front Road, are two recreational facilities. The first is 70 Centre Arena, run by the City of Kingston's Parks and Recreation Department. The other is the new home, as of 2006, of the Royal Kingston Curling Club.

Located to the west and north of the site are five elementary schools: R.G. Sinclair Public School, Welbourne Public School, J.R. Henderson Public School, Polson Park Public School, and Portsmouth Public School. Frontenac Secondary School is also located near the site, west of Days Road.

Our Lady of Lourdes Parish sits on the northwest corner of the site. The Kingsway Outreach Centre, a United church, an Anglican church, and a United Pentecostal church are also within two kilometres of the site.

3.2.2 Commercial Uses

The surrounding commercial uses are predominantly located to the north, along Bath Road and at the southwest corner at the intersection of Days and Front Roads (see figure 3.2 for a map and photos of existing commercial uses). According to Kingston's adopted Official Plan, the section

along Bath Road is considered "arterial commercial" (Adopted Official Plan, Section 3.4E), with the exception of the northwest and northeast corners of the study area which are "district commercial." There is another pocket of commercial use on the southwest portion of the site that is also designated district commercial (Adopted Official Plan, Section 3.4D).

The commercial uses are generally large format retail stores, franchise drive-thru restaurants, vehicle service and sales establishments and similar services. There are also several plaza-style retail developments along Bath Road (Anderton et al, 1996). A site visit revealed the largest, the Frontenac Mall, which lies along the north side of Bath Road, mostly houses large format retail stores on the outside of the building, and there are a number of vacancies in its interior.

Figure 3.2 –Commercial land uses surrounding the Frontenac Institution Lands (City of Kingston 2009) and represetnative images (Authors' collection)

3.2.3 Industrial Uses

South of the Frontenac Institution Lands lies industrial land. These lands are the site of the Invista Nylon Plant, formerly known as DuPont Canada and are the location of the Kingston West Water Treatment Facility (Point Pleasant Water Treatment Plant). Invista is one of Kingston's top ten employers, employing 173 employees in manufacturing, research and development (KEDCO, 2004). Railway lines cross Front Road and service the Invista Site. These lines continue northward along the Little Cataraqui Creek and the subject property, out of the city.

There are two industrial designations surrounding the site; "general industrial," which is associated with the Invista Lands and "waste management industrial," which is associated with the Point Pleasant water treatment plant (see Official Plan, Sections 3.6B and 3.6C). See figure 3.3 for a map and aerial image of these uses.

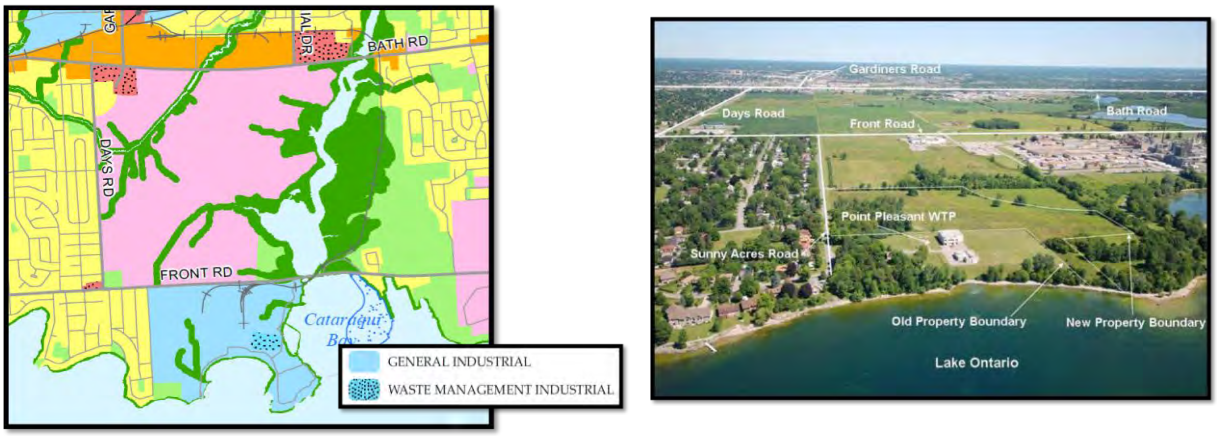


Figure 3.3 – Industrial land uses (City of Kingston, 2009) south of the Frontenac Institution Lands and aerial photograph of the Point Pleasant water treatment plant and Invista (Utilities Kingston, 2009)

3.2.4 Corrections

The Correctional Service of Canada (CSC) is a major employer in the City of Kingston, with several correctional facilities within the city limits. The subject site occupies 338 hectares of land within central Kingston. Within these lands, 11 hectares are directly associated with the correctional facility (Clark Consulting Services, 2007).

Within the site, there are two correctional facilities. Collins Bay Institution opened in 1930, and is a medium security prison, housing 240 inmates. The Frontenac Institution opened in 1972, and is a minimum-security prison, housing 176 inmates. Both institutions operate various rehabilitation programs inside their walls, one of which is the farm (Correctional Services of Canada, 2009).

3.2.5 Agriculture

According to Statistics Canada (2006), there are 197 farms within the City of Kingston; the average farm size is 97 hectares, representing an average farm capital of $687, 750 (2006) and average gross farm receipts of $72, 382.

For the City of Kingston, the top crops produced are tame hay and alfalfa, while the top livestock is cattle, grossing 6,547 heads of cattle (StatsCan 2009). Of the 197 farms in Kingston, 15 report using non-conventional farming methods, producing certified, transitional or non-certified organic products (StatsCan 2009). This translates to approximately 7 percent of the farms in the city, which is comparable to the national representation of organics amongst farms.

The Frontenac Institution resides on 338 hectares, 312 of which are dedicated to the farming operation (Clark Consulting Services, 2007). Figure 3.4 shows some of the current agricultural uses on the Frontenac Institution Lands.

Figure 3.4 – (Left) Agricultural land looking north-east across Frontenac Institution Lands. (Right) Frontenac Institution Lands looking south over corn fields (Authors' Collection).

3.3 TRANSPORTATION

3.3.1 Roads

Major arterial routes, Bath Road, Days Road, and Front Road, bound the property on three sides. Bath Road and Front Road serve as main east-west thoroughfares while Days Road provides for north-south travel. Aerial photography shows that access within the site appears to be restricted to two non-surfaced farm service roads on the property.

Bath Road is classed as a highway with four lanes of traffic and left turning bays at major intersections, although speed limits are signed for 60km/hr. During afternoon peak hours it carries 3735 automobiles (Dillon Consultants, 2004). In 1996, Bath Road was recorded as moving approximately 28,000 vehicles in a 24 hour period, a very high capacity (Anderton et al., 1996). The current Kingston Official Plan outlines an expected widening of Bath Road along its entire length to 42 metres. Gardiners Road, a nearby major commercial district, intersects with Bath Road near the northwest corner of the property.

Front Road accommodates four lanes of traffic and also serves as a major east-west connector. There are few intersections to Front Road along the perimeter of the property, though it does intersect with the entrance of the Invista plant, leads to the Norman Rogers Airport, and connects with residential streets in the southwest corner of the property. This road was reported to carry approximately 14,000 vehicles per day in 1996 (Anderton et. al., 1996), and generally does not experience the congestion of Bath Road. Schedule 4 of Kingston's Adopted Official Plan delineates a proposed future arterial road connecting Centennial Drive to Front Road.

Days Road is a collector road with two lanes of traffic. There is a left hand turn bay at Henderson Boulevard, located half way between Front Road and Bath Road. Schedule 4 of the Kingston Adopted Official Plan delineates a proposed future collector road extending Henderson Boulevard onto the Frontenac Institute Lands as seen in Figure 3.5 below. Kingston's Adopted Official Plan also states that there are plans to align Days Road with Gardiners Road in the near future.

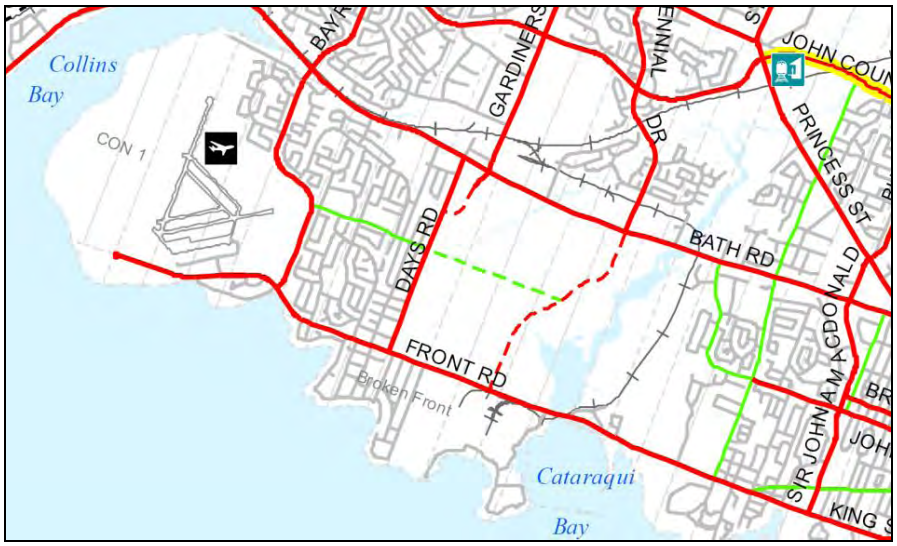


Figure 3.5 – Existing (solid) and proposed (dashed) road extensions on the Frontenac Institution Lands (City of Kingston, 2009)

3.3.2 Transit

The property is currently served by several Kingston Transit routes, with two major bus nodes located along or near the northern corridor at Kingston Centre and Gardiners Town Centre (see figure 3.6 for a map of public transit routes). Bus routes 6, 10, and 71 run along the north and south perimeters of the property, though no buses currently run along Days Road. Route 6 travels one to two blocks west of Days Road along residential streets before connecting to Gardiners Town Centre. Buses primarily run every 15 to 30 minutes during peak hours and every hour through non-peak hours. There are six bus stops for routes 10 and 71 along Bath Road and four bus stops along Front Road in the southern edge of the property. Bus trips make up less than 3 percent of trips along most routes in the vicinity (City of Kingston, 2004).

Figure 3.6 – Public transit routes surrounding Frontenac Institution Lands (City of Kingston, 2009)

3.3.3 Cycling

Currently, "the typical operating space of on-road cyclists is the outside or curb lanes of municipal roadways" (City of Kingston, 2003; 32). The City of Kingston proposes to develop a network of bike paths in order to promote cycling as an alternative mode of travel with the city. One such proposed addition is along Centennial Drive and Taylor Kidd Boulevard to connect Bath Road to Gardiners Road. There is also a plan to connect the abandoned K&P trail to the Little Cataraqui Conservation Area with a cycling path (City of Kingston, 2003).

3.3.4 Airport

The Norman Rogers Airport is located approximately 2.5 kilometres away from the Frontenac Institution Lands and is on Front Road. There are regularly scheduled flight services provided by Air Canada Jazz to Toronto Pearson Airport, as well as charter services available. It is also a provincially contracted air ambulance provider. The Frontenac Institution Lands are located within the "Outer Surface" zone, meaning it is not directly within a flight path but is within the designated four kilometer radius of the airport (City of Kingston, 2007). This zone has a building height restriction of 136 metres (City of Kingston, 2007).

3.4 DEMOGRAPHIC AND LAND USE ANALYSIS

This section provides a brief analysis of the market and demographic conditions of the surrounding area and Kingston in general. It outlines the existing demographic and neighbourhood characteristics, and also the projected future needs for residential, commercial, and industrial lands based on Kingston's Adopted Official Plan, Commercial Inventory and Market Analysis, and City-Owned Industrial Land Strategy.

3.4.1 Residential Analysis

Kingston's Census Metropolitan Area (CMA) population has grown 3.8 percent from 146,838 persons in 2001 to 152,358 persons in 2006 (CMHC, 2008). The City of Kingston itself has 117,700 persons according to the 2006 Census Data, and 53,900 total dwelling units (City of Kingston, 2008). Compared to other CMAs in Ontario, Kingston's population growth is relatively slow (CBOF, 2008). Table 3.1 shows low, medium, and high population growth projections. Based on historical trends, the medium projection for the year 2026 is 133,100 persons and 67,200 dwelling units (City of Kingston, 2009).

Table 3.1 – Population Projections (City of Kingston 2008)

2006 to 2026	Existing (2006)	Low Growth	Medium Growth	High Growth
Number of Total Dwelling Units	53,900	61,600	67,200	73,500
Total Population (Persons)	117,700	122,000	133,100	144,900

The City of Kingston's Urban Growth Strategy (2004) outlines the growth issues and alternatives faced by the amalgamated City of Kingston. A major issue is that the Committed Development Areas, designated in April 2003, can only accommodate 16,405 dwelling units, while a medium

growth projection requires at least 18,856 units (City of Kingston, 2004). The Urban Growth Strategy Plan evaluates several growth options. Since the Frontenac Institution Lands are currently not available, they were not considered as a growth scenario; however, if they were to become available the plan recommends that studies are undertaken to develop the property. It estimates that approximately 211 hectares of developable land, a population of 8,510 persons (based on 25 units/ gross ha) and 2,520 jobs could be accommodated (City of Kingston, 2004).

3.4.2 Profile of Surrounding Residential Neighbourhoods

There is a diverse mix of neighbourhoods that surround the Frontenac Institution Lands. Four of seven neighbourhoods surrounding site (Henderson, Reddendale, Auden Park and Fairway Hills) have above average incomes for the City of Kingston, and predominantly single detached housing. Three of seven surrounding neighbourhoods (Gardiners and Meadowbrooke, Grenville Park, Polson Park) have lower than average incomes for the City of Kingston, with over half the population living in apartments. Table 3.2 demonstrates the demographic mix of the surrounding neighbourhoods by outlining their populations, family incomes, household size, dwelling type, and percentage of home ownership.

Table 3.2 – Neighbourhood Profile of Communities Surrounding the Frontenac Institution Lands (City of Kingston Planning and Development Department, Census 2006)

Neighbourhood Comparison	Total Pop'n	Average Family Income	Average Household Size	Predominant Dwelling Type	% Home Owners
City of Kingston	117,207	$83, 163	2.3	49% single detached, 32% apartments	62.2%
Henderson	3,370	$98, 007	2.6	92% single detached	93%
Reddendale	1,315	$142, 245	2.5	90% single detached	92%
Auden Park	4,810	$85, 434	2.6	Mixed housing types, 59% single detached	77%
Gardiners and Meadowbrooke	5,000	$73, 034	2.3	Mixed housing types, 32% single detached, 45% apartment	75%
Grenville Park	1,695	$67, 608	2	56% apartment, 34% single detached	44%
Fairway Hills	2,450	$87, 608	1.9	68% apartments, 5 or more stories	37%
Polson Park	2,945	$57, 742	2	70% apartment dwellers	30%

The previous table demonstrates the diverse mix of neighbourhoods surrounding the site, in terms of income, dwelling type, and home ownership. As a result, there is no clear neighbourhood type that a new development would need to match. Instead, a variety of incomes, housing types, and home ownership styles could fit within the area.

3.4.3 Industrial and Commercial Analysis

Kingston's economic base includes a blend of manufacturing, business services and research and development. Service sector employment represents 81 percent of Kingston's labour force, with 12 percent employed in manufacturing and 3 percent in contracting (KEDCO, 2000). Kingston's diverse employment in sectors such as education services and health services has resulted in relatively moderate and stable economic growth (CBOC, 2008).

At present, there are enough vacant commercial and industrial properties to meet the needs for employment growth. The City of Kingston's Urban Growth Strategy outlines a medium growth scenario with 15,000 projected jobs and a high growth scenario with 25,000 jobs (City of Kingston, 2004). The high growth rate projection is based on 1,000 jobs per year and has been used to project land needs (City of Kingston, 2004).

Urbanmetric's (2008) "Commercial Inventory and Market Analysis" outlines the current status of commercial market conditions in the City of Kingston. There is approximately 9 million square feet of retail and services space in the City of Kingston. Of the total inventory, about 19 percent of retail and service space is contained in the downtown area, while 30.4 percent is found at arterial commercial locations. The overall vacancy rate is 4.6 percent, which is considered representative of a healthy market (Urbanmetrics, 2008). Their projections indicated that by 2026, there will be a demand for some 3.3 million square feet of new retail and services space, all of which can be accommodated on vacant commercial sites, approved and proposed retail developments. Their report recommends planning for a greater balance between power centre retail formats and locally accessible retail facilities that meet the demands of an ageing population. (Urbanmetrics, 2008).

A City-Owned Industrial Land Strategy report produced by Clark Consulting Services, with Clayton Research associates and Totten Sims Hubicki Associates (2005), concludes that the City has an adequate supply of industrial lands. Further, these lands are able to meet the employment requirements for the industrial- and business-park-type development within the City (Clark Consulting Services, 2005). The Strategy found that it will be critical to maintain key industrial parcels and industrial park areas for business and industrial location, but that no new land needed to be designated as industrial (CCS, 2005).

4.0 Environmental Conditions

The Frontenac Institution Lands have a diverse natural environment that includes fields, forests, and wetlands. Recently, efforts have been made to restore certain wetland areas and enhance their wildlife potential (KFN, 2004). The presence of Correctional Service of Canada has also affected the natural environment of the site by limiting alternate site developments and restricting access to the wetlands; this has resulted in a quiet and secure habitat for local wildlife (KFN, 2004).

4.1 ABIOTIC CONDITIONS

The site has limestone bedrock covered by approximately 3.5 metres of glacial and lake influenced surface deposits (KFN, 2004). Two small scarps, located in the northwest and northeast site corners, run parallel to the creek and contribute to the topography of the land (Vreeken 1994).

The soil type is predominately clay with a few instances of peat in the cattail marshes on the east side of the site (KFN, 2004). The majority of the soils are considered "class 2," based on the Canadian Land Inventory for agriculture classification system, a scientific analysis that considers soil and climate potential (OMAFRA, 2009). Class 2 means that the soils have "moderate limitations that reduce the choice of crops, or may require soil conservation practices, under good management they can have moderately high to high productivity." (OMAFRA, 2009) A single patch down the middle of the site is "class 3", which has more severe limitations, and is the lowest class that is still considered prime agriculture lands (OMAFRA, 2009). The northwest corner is class 4, 6 and 7. Class 4 has severe limitations and is limited to specially adapted crops or management, class 6 is limited to unimproved livestock grazing, and class 7 is the lowest class and considered completely inappropriate for agriculture (OMAFRA 2009). Figure 4.1 shows a photograph of the site while Figure 4.2 displays the soil categories present at the site.[3]

Figure 4.1 – Photograph of Frontenac Institution Lands (note rise on right) (Authors' Collection)

[3] Although OMAFRA Canadian Land Inventory soil classifications are considered a standard measure of soil capability, there has been criticism from within farming community and suggestions that the classifications are now outdated. As a result, soil classifications on this land could be higher. See Appendix 1 and 2 for complete workshop comments on the site's soil classifications.

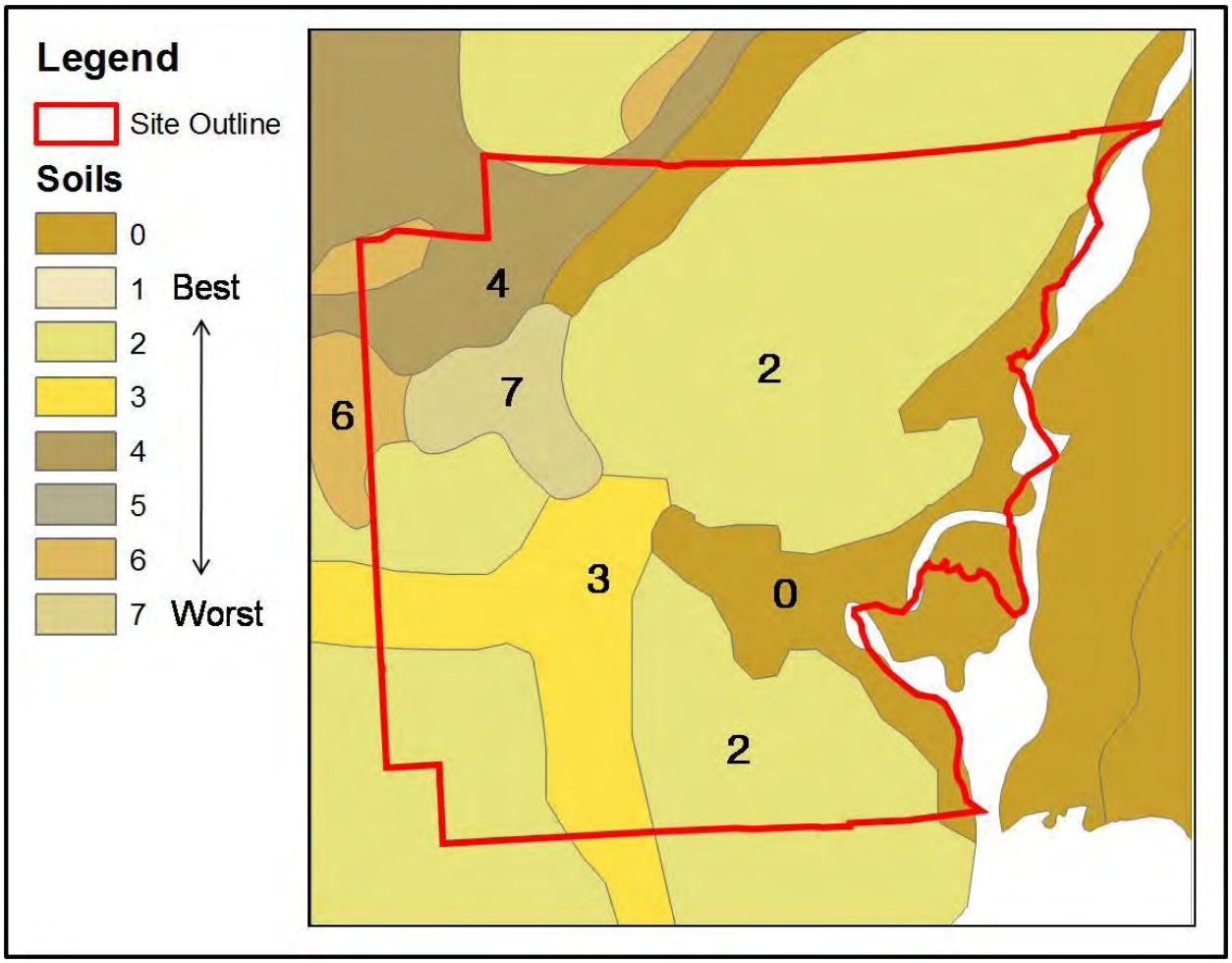


Figure 4.2 – Soil Classification of the Frontenac Institution Lands (KFN, 2004)

The hydrology of the site is strongly influenced by Lake Ontario to the south. Storms, seasonal changes, precipitation and evaporation, and long-term trends all affect the creek water levels (Crowder et al., 1996). Yearly fluctuations are between 0.01 and 0.5 metres, with the potential for changes as large as one metre (KFN, 2004). Two small streams feed the creek, and run west-east along the site. The northern stream has been partially restored by Ducks Unlimited to increase channel complexity (KFN, 2004). Five small ponds, agriculture and cattle restrictions, and vegetation plantings all increase its habitat potential (KFN, 2004).

Historically, the fluctuations in creek water levels were significantly larger. However, berm construction for shipping, combined with the road and rail bridges at the south end of the site, have stabilized water level fluctuations (KFN, 2004). This has resulted in increased sedimentation, eutrophication, and cattail in-growth, which began around 1953 (KFN, 2004).

The chemical water quality of the creek approximates norms within the area, although there are elevated manganese and iron concentrations and spring runoff tends to increase salt concentrations (Environment Canada & COCA, 2004). The turbidity of the creek is, however, a major concern, and measurements indicate that there may be insufficient light penetration (KFN, 2004). This can result in plant die-off, which creates anoxic conditions and subsequently harms

creek fauna. The high turbidity is caused by sediment and algae, and is further compounded by re-suspension by carp that live in the stream (KFN, 2004).

4.2 BIOTIC CONDITIONS

There are a large variety of habitats on the Frontenac Institution Lands, which include forest, marsh land, open water, meadow, and farmland. Ten different "ecosites," a biological classification system based on plant compositions, have been identified on the lands (KFN, 2004). Figure 4.3 illustrates these ecosites. In total, 292 plant species, from 72 different families, have been found on the site (KFN 2004). No provincially or regionally significant plants were found, but there are three locally significant plants: crested sedge (*Carex cristatella*), sessile-leaved bellwort (*Uvularia sessilifolia*), and pale sedge (*Carex pallescens*) (KFN 2004). There were also a large number of introduced species (KFN, 2004).

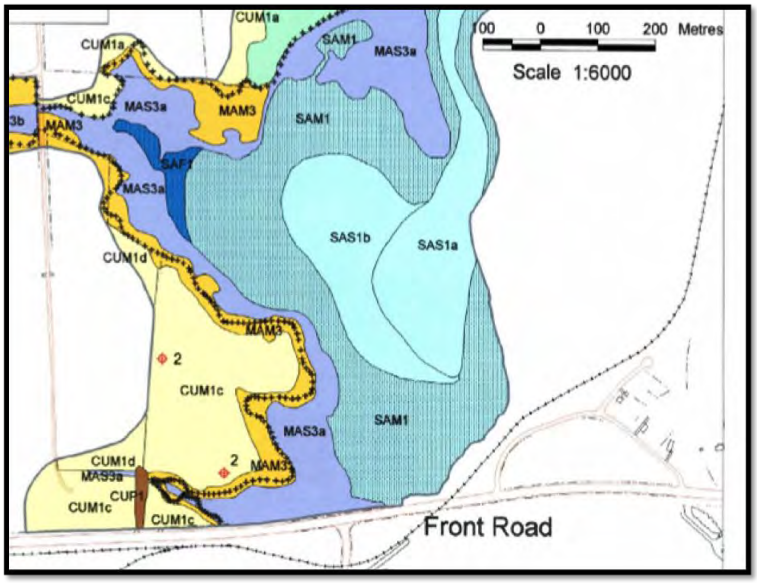


Figure 4.3 – Ecosite Classifications of the Frontenac Institution Farmlands (KFN, 2004)

Surveys also recorded 13 species of mammals, including three that are wetland dependent: the American beaver, Muskrat, and American Mink (KFN, 2004). Although the smaller mammals found may remain on the site, for most of the larger mammals, the site is likely only part of a larger habitat range (KFN, 2004).

The site also provides good bird habitat, due to the privacy it offers by excluding human intrusions and noise and light pollution (KFN, 2004). Birders have recorded 64 different species of nesting birds, and 35 additional species of migratory birds that use the area for feeding and resting (KFN, 2004). Three of the birds are considered species at risk in Ontario: the least bittern (*Ixobrychus exilis*), black tern (*Chlidonias niger*), and short-eared owl (*Asio flammeus*). The short-eared owl and black tern are both listed as species of "special concern," meaning that they are sensitive to human disturbances (MNR, 2009). They have been seen nesting in the open marsh areas, and in the emergent cattail vegetation, respectively (KFN, 2004). The least bittern is considered "threatened," meaning that it is at risk of becoming endangered (MNR, 2009). It has been seen nesting in the cattails surrounding Little Cataraqui Creek (KFN, 2004). The major

threat to its survival is the draining of marshes for farmlands or urban uses, since the species requires large quiet areas (ROM, 2008).

The area is also home to four species of frog, one species of salamander, three species of turtles, and one species of snake (KFN, 2004). The turtle species include the northern map turtle (*Graptemys geographica*), which is a species at risk of special concern (MNR, 2009). A larger northern map turtle population is found nearby at Elevator Bay, an area with better and larger turtle habitat (KFN, 2004).

Finally, the site is also home to a wide range of invertebrates. Aquatic sampling of macro invertebrates just north of Bath Road found a large variety, which is an indicator of a healthy community and a healthy water system (Ritchie, 2003). Additionally, 13 species of dragonflies and damselflies, all common to Kingston, and 9 species of butterflies have also been recorded (KFN, 2004). One of these species of butterfly, the Monarch (Danaus plexippus), is considered at risk, and is listed as being of special concern (MNR, 2009). The site has a large milkweed population (*Asclepias syriaca*), which the monarch may use for nesting (KFN, 2004). The late-blooming populations of Canada goldenrod (*Solidago canadensis*) and New England aster (*Aster novae-angliae*), may also be an important food supply for Monarch population (KFN, 2004).

4.3 REGIONAL SITUATION

The Frontenac Institution Lands are situated within a network of parks and greenbelts called a natural heritage system. A natural heritage system consists of core areas, which are the system's "building blocks" that provide and sustain ecological functions (Ministry of Natural Resources, 2009). These areas are connected through linkages, which allow for the natural movement of plants and animals (Ministry of Natural Resources, 2009). Combined, these features help prevent habitat fragmentation, preserve biodiversity, and provide natural adaptation responses to the potential impacts of climate change (Ministry of Natural Resources, 2009).

Five major parkland areas are located near the site, and can be equated with "core areas" within the region. These include the Parks of the St. Lawrence to the east, Little Cataraqui Creek Conservation Area to the north and east, Lemoine Point to the west, Gould Lake Conservation Area to the north, and Rideau Acres to the northeast (KEDCO, 2000).

The City of Kingston's Adopted Official Plan also lays out key environmentally sensitive areas, called Natural Heritage "A," where no development can occur (City of Kingston 2009). Figure 4.4 indicates the areas closest to the Frontenac Institution Lands.

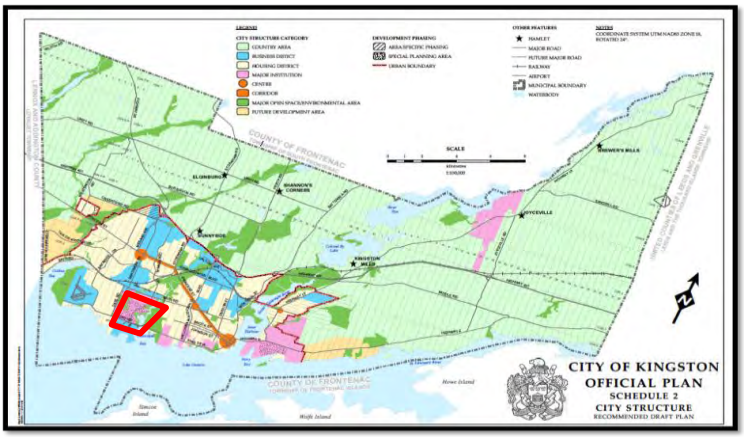


Figure 4.4 – Green spaces of Kingston (City of Kingston 2009)

4.4 SITE ENVIRONMENTAL CONSTRAINTS

The previous section outlined the environmental conditions of the site and some of its ecologically sensitive aspects. The following map (figure 4.5) is based on data supplied by the Cataraqui Conservation Authority and depicts the type of constraints the abiotic and biotic conditions produce. These constraints were considered during the stakeholder workshop, and in the subsequent development of the two concept plans.

Some of the key constraints include the regulation limit (in red), that shows the extent of the floodplain. If the site were to be developed, no building could take place within this limit. The map also depicts the wetland and existing wooded areas. The wetland is included within the regulation limit, and is therefore protected, although its broader hydrological connections should be considered. Some of the wooded areas are outside this limit and not legally protected. However, they are an important aesthetic and ecological site feature and could be important to any future site changes. Finally, the purple dots indicate areas of natural and scientific interest. The nature of these areas, and potential negative impacts to them, would need to be further assessed through site surveys and assessments if changes occurred.

Figure 4.5 – Environmental constraints on the Frontenac Institution Lands (GIS map based on CRCA data)

5.0 Case Studies

5.1 INTRODUCTION

The following case studies are the result of an international environmental scan that looked for innovative and meaningful precedents in design, approach, and tools that would be relevant to the site. These case studies rest in three broad categories: green design, agriculture, and infrastructure. Each case study highlights the program or approach used, its key features, how it was implemented, key lessons, and sources for further information.

The following table summarizes the case studies explored (Table 5.1). This provides a quick reference guide for readers regarding particular cases referred to in the later chapters of this report.

Table 5.1 – Summary table of case studies used in this study. Cases are devised in three categories: green design, agriculture and infrastructure.

	Section	Name	Location	Key Element
Communities + Green Design	5.2.1	The Meadows on the Hylebos	Pierce County, Washington	Low Impact Design Demonstration Site - low density
	5.2.2	Pembroke Woods	Frederick County, Maryland	Low Impact Design Demonstration Site - medium density
	5.2.3	Dockside Green	Victoria, British Columbia	Closed Loop Community - High Density
	5.2.4	Village Homes	Davis, California	An early example of the incorporation of green design and technology into neighbourhood design.
Communities + Agriculture	5.3.1	The Intervale Centre	Burlington, Vermont	An agricultural education centre
	5.3.2	Harvest	Chatham County, North Carolina	Rural home sites situated around a farm
	5.3.3	The Southlands	Tsawwassen, British Columbia	Canada's first farm subdivision, an example of agricultural urbanism
	5.3.4	Prairie Crossing	Grayslake, Illinois	A conservation subdivision aimed at conserving land for wetlands, prairie and a farm with complimentary education centre/demonstration site
	5.3.5	University of British Columbia Farm	Vancouver, British Columbia	A student and alumni-run organic University farm. Combating pressures of development
	5.3.6	Central Experimental Farm	Ottawa, Ontario	A federally-run agricultural and scientific research facility with an urban location.
Communities + Infrastructure	5.4.1	St. John's Sideroad	Aurora, Ontario	Low impact road development through a sensitive wetland
	5.4.2	Long Point Causeway Plan	Long Point Peninsula, Southern Ontario	Proposed low impact road development through a sensitive wetland
	5.4.3	Cobalt Constructed Wetland Wastewater Treatment System	Cobalt, Ontario	A constructed wetland to treat municipal sewage
	5.4.4	Central Park	Davis, California	A well-used multi-use park. Containing a landscaped park, recreational fields, community and native plant gardens, as well as a farmer's market.
	5.4.5	Gunma Insect World	Kiryu City, Gunma Prefecture, Japan	It is a nature conservation and ecological education project
	5.4.6	The Kortright Centre	Woodbridge, Ontario	One of Ontario's premier environmental and renewable energy education and demonstration centres. Various education and workshop programs for school-aged children, the public, trades and professionals
	5.4.7	Eishin Gakuen	Iruma City, Saitama Prefecture, Japan	A private high school and college campus that was designed in deep appreciation for the natural features and history of the site.

5.2 COMMUNITIES AND GREEN DESIGN

The following case studies outline some of the best international practices in green design. Green Design includes technologies, neighbourhood design or orientation, and consideration of environmental sensitivities. The incorporation of green design within the site concept is essential to achieving sustainability and mitigating any effects development could have on the site's natural features. These cases highlight innovative approaches; however, the regulatory and social constructs in each case are unique.

5.2.1 The Meadow on the Hylebos

Overview

The meadow on the Hylebos is a Low Impact Development (LID) approach to designing a subdivision located in Tacoma, Washington. LID rivals conventional subdivision planning and design as it incorporates stormwater control through the creation of a hydrologically functional landscape that mimics the natural hydrologic regime. This is especially important for this location to protect a stream used by spawning salmon. It is a 35 unit, 3.6 hectare development situated within the geographic centre of the urban growth area of Pierce County. ABHL, a consultant firm based out of Seattle and Tacoma, oversaw the land use planning, civil engineering and landscape architecture for this site. The site was such a success that the firm now displays it as their LID demonstration project offering inspiration and approaches for others wishing to take on this new approach to neighbourhood design.

Key Elements

- 48 percent of the site is open space
- Revegetated and enhanced wetland buffers
- Narrow roadway widths and pervious surfaces
- Roadside bioswales in lieu of traditional curb and gutter
- Open conveyance
- Retention of existing significant vegetation
- Cluster residential units to minimize building footprint and the length of driveway access

Implementation

The implementation of this project required partnerships and collaboration between several parties. Partnerships existed between Pierce County, AHBL (the Consultants), the property owner and the developer for planning and construction.

Key Lessons

This site is similar to the Frontenac Institution Lands as there were both physical and environmental constraints. The Meadows on the Hylebos contained a significant salmon watercourse within the site that warranted responsible design of the subdivision. Similarly, the Frontenac Institution Lands contain a significant watercourse, Little Cataraqui Creek. The collaboration between various groups, including the County, ensured that policy and regulatory changes were addressed. Similar partnerships and collaboration may be necessary for the Frontenac Institution Lands for the unconventional principles of LID to come to fruition.

Clar, M. 2005. Pembroke Woods: Lessons Learned in the Design and Construction of an LID Subdivision. American Society of Civil Engineers. <http://www3.villanova.edu/vusp/bmp_research/Outreach/pasym03/pdfs/4A4.pdf>.

ECONorthwest. 2009. Low Impact Development At The Local Level: Developers' Experiences and City and County Support. <http://www.econw.com/reports/2009_ECONorthwest_LID-Clackamas-County-Case-Study.pdf>.

EPA. Pembroke Woods Retrofit, Frederick County, MD. Green Communities: Stormwater and Runoff Management. <http://www.epa.gov/greenkit/stormwater_studies/Pembroke_Woods_MD.pdf>.

Sources

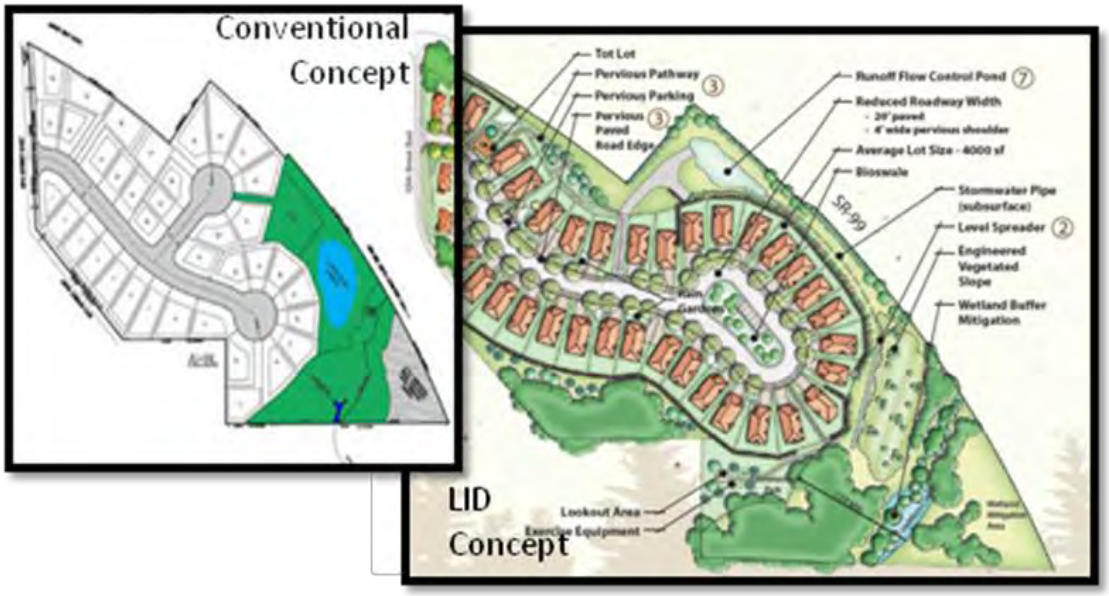


Figure 5.1 - Meadow on the Hylebos, Low Impact versus Conventional Development (Clar, M. 2005)

5.2.2 Pembroke Woods

Overview

This residential development is the first subdivision to employ the low impact design (LID) manual developed by Prince George County, Maryland. It is located in Frederick County, Maryland. It is a 17.4 hectare, 70 lot development. It was originally designed as 97 lots, each measuring 0.1 hectare, which required conventional stormwater management technologies and the clearing of most of the wooded area on the property.

Key Elements

- Minimization/reductions of impacts (minimal disturbance techniques)
- Reduction of impervious areas (rural/narrow streets, eliminate curb & gutter, eliminate sidewalks)
- Disconnect impervious areas (roofs, driveways, streets), slowing water's movement and allowing time for infiltration and settlement of sediment

- Mitigation for runoff impacts using LID integrated management practices (IMPs) such as bioretention, grass swales, dry wells, filter/buffer strips, rain barrels, cisterns and infiltration trenches

Implementation

As LID practices are often contrary to the wishes of various city departments, it was necessary to gain approval for this approach via permitting and demonstration sites. To ensure the IMPs function properly, sufficient homeowner education and awareness of their function and maintenance is required. Those wishing to adopt LID technologies must be able to stand by its implementation as well as be prepared to develop and administer information to property owners on their role in ensuring that the techniques employed on the site are functioning properly.

Key Lessons

The Frontenac Institution Lands contain Provincially Significant Wetlands and are located along the shore of Lake Ontario. Implementing subdivision design that follows LID secures interest, minimizing impacts on the natural environment. This design type is in a clustered format that, unlike conventional suburban development, ensures the footprint on the land is minimal.

Sources

Clar, M. 2005. Pembroke Woods: Lessons Learned in the Design and Construction of an LID Subdivision. American Society of Civil Engineers. <http://www3.villanova.edu/ vusp/bmp_research/ Outreach/pasym03/pdfs/4A4.pdf>.

ECONorthwest. 2009. Low Impact Development At The Local Level: Developers' Experiences and City and County Support. <http://www.econw.com/reports/2009_ECONorthwest_LID-Clackamas-County-Case-Study.pdf>.

EPA. Pembroke Woods Retrofit, Frederick County, MD. Green Communities: Storm water and Runoff Management. <http://www.epa.gov/greenkit/stormwater_studies/Pembroke_ Woods_MD.pdf>.

5.2.3 Dockside Green

Overview

Dockside Green, located in Victoria, B.C., is a six hectare brownfield mixed-use development with an estimated population of 2,500 people. It is a model LEED-ND project, and is targeting LEED platinum certification, making it one of the premier green developments in the world. Its construction commenced in 2005, with a projected completion date of 2017. A partnership between a developer, Windmill West, and a credit union, VanCity, has made it possible. Some of its key innovations include green construction technologies, environmental site considerations, energy efficiencies, and social integration.

Key Elements

- Double-glazed, low-emitting windows, high insulating walls, external shading devices, green and local materials, and on-site sewage treatment and grey water recycling
- Native plant landscaping, shoreline restoration, naturalized water features for storm water management, habitat creation, green

walls and roofs
- On-site biomass power generation, car-share co-op, mini transit, bike lockers, demonstration for solar heating/ photovoltaic/small building wind turbines
- Community liaison group, connections to broader regional trail system, amphitheatre, showcase locally-sourced products, signage for historical/First Nations/environmental importance, some affordable housing unit

Implementation

Partnerships were a key feature to implementing Dockside Green. The development partnership between Windmill West and VanCity was an important component to financing, with VanCity funding two-thirds of the project. There was also considerable support from the City of Victoria. This included a dedicated staff member who helped facilitate the project, and a generous bidding process that included the anticipated social and environmental values of tendering bids. This helped developers receive the land at a lower cost, although financial penalties were created to penalize the developers if they did not fulfill their projected environmental and social targets. Technology grants from the federal government provided further assistance. Additionally, a group was formed to liaise between the project and the community to ensure that the existing neighbourhoods were integrated in the design.

Key Lessons

Based on Kingston's size, climate, and regional context, some of the most transferable aspects may be the integration of walkways with regional trail systems, naturalized water features and grey water recycling to minimize impacts on the wetland, the use of energy efficient demonstration technologies, and the creation of a community liaison group to coordinate the site with existing uses. Also relevant is the amount of city support this project required, beginning with the bidding process and carrying through into site development.

Sources

Ling, C., K. Thomas & J. Hamilton. 2009. "*Triple Bottom Line in Practice: from Dockside to Dockside Green.*" Royal Roads University: Community Research Connections. Accessed October 10, 2009 at <http://www.crcresearch.org/case-studies/case-studies-sustainable-infrastructure/land-use-planning/triple-bottom-line-practice-f>

Windmill West – VanCity. 2009. "Dockside Green." Accessed October10, 2009 at http://docksidegreen.com

Figure 5.2 – Dockside Green (Dockside Green Media Centre)

5.2.4 Village Homes

Overview

Village Homes, located in Davis, California, provides an example of a well-established green development that considered energy efficiency, storm water management, green space, and community cohesion. It is a 27.5 hectare development, located on the western edge of the city that was developed in 1974-75 by Michael and Judy Corbett. It consists of 225 single-family homes, 20 apartments and co-op residences, business space, a community centre, a playing field, a swimming pool, and an inn.

Key Elements

- Energy conscious construction (climate adapted, solar design, solar heating)
- Naturalized swales for storm water runoff
- Narrow curving roadways with emphasis on biking and pedestrian walkways
- Individual builders could buy lots and construct homes
- Houses face common areas/walkways rather than roads
- Focus on community building
- Edible landscaping, almonds are sold as a cash crop
- Shared community ownership and management of community gardens, orchards, vineyards

Implementation

The project was financed by Sacramento Savings and Loan and phased over five years. It is now considered a very desirable, and expensive, neighbourhood.

Key Lessons

Village Homes uses interesting techniques for fostering community spirit and increasing energy efficiency, although some of these may not be applicable in Kingston's climate. Some of the green design features that may be successful on the Frontenac Institution Lands include energy conscious lot orientation and the naturalized swales for storm water management. The idea and management of the shared community features such as gardens, orchards, and vineyards could also be applicable. Community members elect a board to coordinate these areas, most work is done on a volunteer basis, and harvesting is on the honour system.

Sources

Bainbridge, D. 2003. "Sustainable Community – Village Homes, Davis, California." EcoComposite. Accessed on October 10, 2009 at <http://www.ecocomposite.org/building/villagehomes.htm>

Wack, P. 2005. "Village Homes, Davis, California: A Learning Lab for Future Planners" *FOCUS: Journal of the City and Regional Planning Department (Cal Poly), 2*. Pages: 36-39.

Village Home Owners Association. 2008. "Villages Homes." EcoComposite. Accessed on October 10, 2009 at <http://www.villagehomesdavis.org>

5.3 COMMUNITIES AND AGRICULTURE

These case studies showcase integration of agriculture within a particular project or development. They represent a range in examples: from agricultural outreach and education centres to entire subdivisions built on promoting and supplying locally sourced food.

5.3.1 The Intervale Center

Overview

The Intervale Center, a not-for-profit organization based out of Burlington, Vermont seeks to nurture and sustain farms, land, and people. They manage 142 hectares of farmland, nursery, compost production, trails, and wildlife corridors. Their mission is to develop farm and land-based enterprises that generate economic and social opportunity while protecting natural resources.

Key Elements

- Offers agriculture development services such as incubator farm programs, work to connect local producers and consumers
- Growing native trees and shrubs for riparian area restoration
- Youth Training on agriculture and local food
- Calkins Farmstead learning centre

- Recycling 30,000 tonnes of waste each year to produce a wide range of compost-based agricultural and horticultural products

Implementation

In 1986, Gardener's Supply Company began a community-wide effort to revitalize this unique natural resource (the area was known as The Intervale before the center existed) and reinvigorate local, sustainable agriculture. It has since grown to be the community anchor it is today.

Key Lessons

This site is similar to the Frontenac Institution Lands as it is located next to a floodplain, but also because the Frontenac Institution Lands presents a similarly large piece of urban land where agricultural education could take place on a variety of scales. Given the adjacent lands are owned by the Cataraqui Conservation Authority, the education component is a natural fit.

Sources

The Intervale Center, 2009. Burlington, Vermont.
<http://www.intervale.org/index.shtml>.
Gardener's Supply Company, 2009. Burlington, Vermont.
<http://www.gardeners.com/The-Intervale/5446,default,pg.html>.

5.3.2 Harvest Community

Overview

Located within New Hope Valley in Chatham County, North Carolina, the site is an 86 hectare farm community focusing on the relationship with its residents and their food source. The development consists of 19 strategically placed home sites on a minimum of four hectares each. The central farm is the heart of the community with a barn that combines farming activities with space for community interaction.

Key Elements

- 4 hectare Central Farm (organic)
- Rural-style living with large lot home sites using Low Impact Design techniques
- Property owners at Harvest have the option of farming their own land or leasing their land to the Harvest Farm Group, an independent group that manages the community's farming operations
- Home sites are restricted to certain locations and continuous areas of farmland are maintained across multiple properties
- Adjacent to the Haw River and Jordan Lake State Recreation Area

Implementation

This development seeks to preserve agricultural land while offering the non-farmer access to a rural, sustenance-based life style. Wieler Developments, who focus on lifestyle communities, privately developed this community.

Key Lessons

The Frontenac Institution Lands perhaps are not suitable to rural home sites but the concept of community members owning a stake in land that is protected for farming, with the ability to lease their land out is certainly relevant. In addition, the central organic farm is something that can be

applied to the Frontenac Institution Lands. Finally, the recreation opportunities offered by the adjacent natural areas to the Harvest Community are much like the protected areas and other natural features (i.e. Lake Ontario) that are near the Frontenac Institution Lands.

Sources

Wielder, 2009. *Harvest Community Development.* <http://www.wieler.com/communities/harvest>.

5.3.3 The Southlands

Overview

This project may become the first Canadian example of a farm subdivision. The 142 hectare site planned to accommodate 30 percent each of residential or mixed-use land, parks and open space, and agricultural land. Active agricultural uses are planned throughout the community, progressing from large farms on the outskirts to smaller farms on the village periphery, and to community gardens and window boxes scattered throughout the densest areas. The Southlands project includes a farmers' market, culinary school and agricultural university at its centre, reinforcing the centrality of food to the development. Agricultural lands will be placed in a communally held land trust, the details of which remain under discussion.

Key Elements

- One third of the site will be devoted to agriculture, one third to open space/amenities and one third will be dedicated to residential
- Agriculture Transect
- Farmers Market, Agricultural University, overall agriculture focus
- Extensive public consultation and community involvement throughout the development process

Implementation

In October 2006, Century Group started the process to place the future vision and development of this site into the hands of a volunteer group of South Delta residents. Based on this invitation, two-dozen citizens came forward as the Southlands Community Planning Team (SCPT) and worked with Century Group over 2007 and early 2008 in creating broad objectives for the Southlands. A cumulative total of over two thousand hours of meetings, trips and discussions was concluded in April 2008 and the SCPT's work was documented in the 'Southlands Design Brief.'

Key Lessons

This being the only Canadian example (versus primarily US development of this form) taking place where there is an integration of agriculture and development, there is much to be taken away. The exclusive focus on agriculture with the market and agricultural university are ideas transferrable to the Frontenac Institution Lands. The idea of transitioning from "rural agriculture" to "intra agriculture" through the development is also something that is very possible on the Frontenac Lands.

Sources

Gallant, E. and Werkerle, G. 2009. Farm Subdivisions. Plan Canada. 49(2).
Southlands Project Website and Blog.

<http://www.southlandsintransition.ca>.

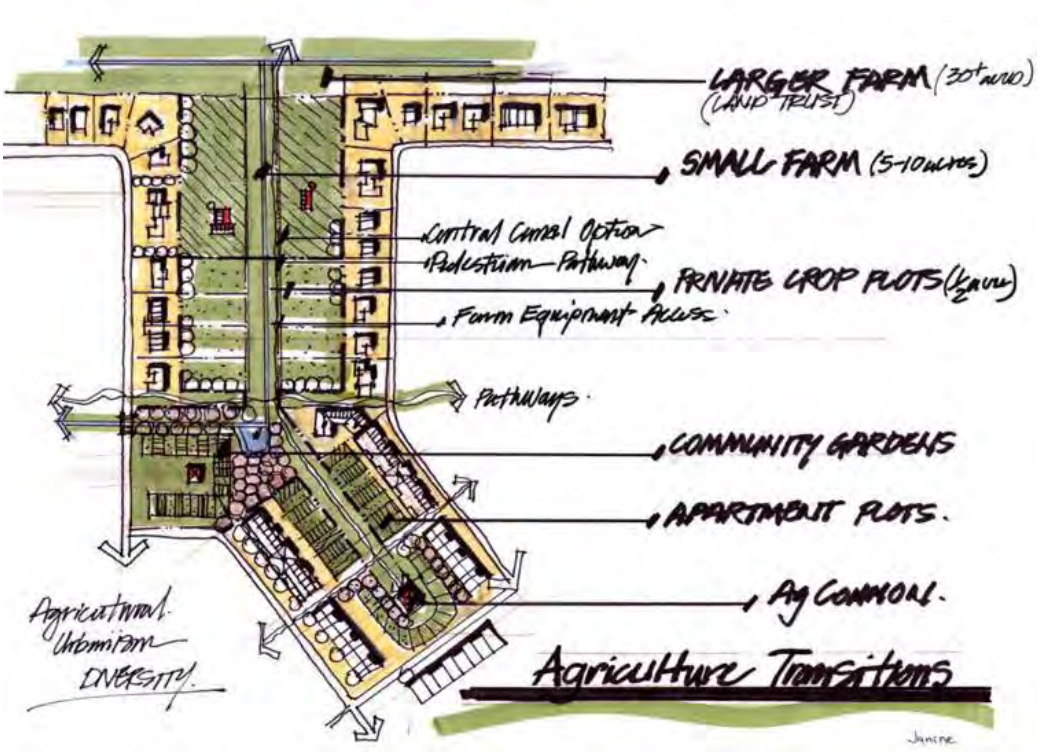


Figure 5.3 – Agricultural Transitions from The Southlands Design Charette (Southlands in Transition, 2009)

5.3.4 Prairie Crossing, Grayslake, Illinois

Overview

This site is a 274 hectare conservation development that is part of the 2023 hectare Liberty Prairie Reserve. It includes clustered homes on 20 percent of the land, restored wetlands, a prairie, walking trails, 62 hectares reserved for organic farming with a family farm on 16 hectares, a 1.2 hectare demonstration farm offering farm education for children and youth, and a farmer's market.

Key Elements

- 10 percent Commercial, 70 percent open space, 20 percent residential (including 36 ha organic farm)
- Connectivity to regional transit system – Chicago's Union Station in a little over an hour by train or car with a transit stop within walking distance
- Farm acts as community learning centre and farm market

Implementation

Private citizens who wanted to preserve open space and agricultural land purchased the land that makes up Prairie Crossing in 1987. They formed a company with the goal of developing the land responsibly, with a total of only 359 single-family homes and 36 condominiums as opposed to 2,400 homes that were planned by another developer. George and Victoria Ranney, a husband and wife team, have guided the development

of Prairie Crossing since its inception.

Key Lessons

The Prairie Crossing Community's location to transit and its mix of housing types (single family, condominiums) is very applicable to the Frontenac Institution Lands given its position in the middle of Kingston's urban boundary. The working organic farm and farmers market are key features that could be modeled to preserve the prime agricultural land on the Frontenac Institution Lands. The key lesson is the vision from the developer to integrate residential and agricultural uses, offering people a connection to their food source.

Sources

Gallant, E. and Werkerle, G. 2009. *Farm Subdivisions*. Plan Canada. 49(2)
Prairie Crossing, 2009. Community Website.
<http://www.prairiecrossing.com/pc/site/amenities.html>.

5.3.5 UBC Farm

Overview

The farm sits on 24 hectares of land at the University of British Columbia. The farm operates under a 'student-driven model' that integrates aspects of sustainability, land management, food production, community outreach and education.

Key Elements

- Primarily agricultural uses on the land but also contains an agroforestry trail and farmer's market
- Teaching, research and community farm
- Solely organic forms of farming used
- Community outreach and learning opportunities to the city
- Incorporates cultivated fields, teaching gardens, forest stands, hedgerows, orchard planting, medicinal gardens, free range chickens, and honey bees
- Transit accessible
- Goal to create a sustainable enterprise, establish it as a vital campus facility, advance research, and advance the university's sustainability and community health initiatives

Implementation

In 2000, the farm was under threat by plans to develop the lands for housing. At this time concerned students and alumni rallied to save the lands for agriculture.

Key Lessons

The UBC Farm illustrates how to revitalize an established farm through a diversity of new agricultural practices. It also illustrates a model as to how to approach viability and community outreach.

Sources

UBC Farm. <http://www.landfood.ubc.ca/ubcfarm/index.php>.

5.3.6 The Central Experimental Farm

Overview

A 427 hectare cultural heritage landscape and a National Historic Site surrounded by the City of Ottawa. It is a centre for agricultural research and is a working farm for the Research Branch of Agriculture and Agri-Food Canada. The farm originally sat on the outskirts of the city of Ottawa; it now sits as a prevalent presence in the urban landscape. It is home to various national research centres.

Key Elements

- A 26-ha arboretum sits between the experimental farm and the Rideau Canal
- Ornamental gardens
- Greenhouses
- Heritage buildings
- Canada Agriculture Museum
- Volunteer supported programs "friends of the farm"

Implementation

Originated in 1887 on 188 hectares on the western outskirts of Ottawa as an experimental farm and arboretum. It has grown to more than 400 hectares. The site has a policy framework, "the Central Experimental Farm National Historic Site Management Plan," that ensures a balance between the research and tourist/recreational uses of the site.

Key Lessons

Maintaining the integrity of historic agricultural lands within a city by establishing it as a tourist draw and managing it through a collective of volunteers.

Sources

Friends of the Central Experimental Farm. <http://www.friendsofthefarm.ca/index.htm>.

Agriculture and Agri-Food Canada. Central Experimental Farm. <http://www4.agr.gc.ca/AAFC-AAC/display afficher.do?id=1170701489551>.

Figure 5.4 - Ottawa Experimental Farm (http://farm3.static.flickr.com/2462/3975391284_293dd9e392.jpg)

5.4 COMMUNITIES AND INFRASTRUCTURE

The following case studies present a variety of approaches to sustainable infrastructure in other vicinities. Infrastructure includes items that make a community function – from roads to community facilities.

5.4.1 St. John's Sideroad

Overview

St. John's Sideroad is a major east-west arterial road located in Aurora, Ontario (York Region). The road required an expansion from two to four lanes over two kilometres, but crossed McKenzie Wetland, a Provincially Significant wetland. Working with consultants and engineers over a 10 year process, the City sought to minimize the impact on the wetland, decrease wildlife mortality, enhance pedestrian and bike access and safety, improve road safety, and connect to a trunk sewer. The project was completed in June 2006.

Key Elements

- Dry/Wet culverts to allow water flow and wildlife passage
- Sheet pile vertical walls to minimize intrusion into wetland
- Curbs and gutters with oil grit separators, and infiltration swales, to catch and treat runoff
- Root wads to enhance fish spawning
- Boardwalk system for pedestrian and cyclists with viewing platforms and signage, linked to a larger trail system
- Decorative street features and lighting (with measures to reduce light spillage) to enhance aesthetics and safety
- Extensive monitoring: 2 years prior, during, and after construction (amphibian calls, breeding birds, road kill, passage use)
- Context Sensitive Solution (CSS) approach: public consultation, one-on-one with stakeholders, visuals and rendering to enhance understanding and modify designs

Implementation

The project initially met with a large degree of public resistance, although it was widely accepted upon completion. The CSS approach is credited with enhancing understanding and approval, and modifying many of the design's aesthetic features to encourage use and acceptance. Public suggestions included more attractive facing for the retaining walls, and a curving walkway. The project was achieved through partnerships with the Ministry of Natural Resources, Lake Simcoe Region Conservation Authority, Town of Aurora, and York Region. York Region contributed the financing for the road, while the Town of Aurora contributed extra money for the lighting, boardwalk, and other non-essential design components.

Key Lessons

The location and environmental concerns are very similar, so many of the features from this case study could easily be applied in Kingston. Some of the most applicable include integrating road construction with increased pedestrian and bike access, and a CSS approach that uses extensive public consultation to create a roadway that people will visually appreciate and use. The environmental mitigation techniques are also

relevant, including the extensive monitoring, storm water management designs, vertical retaining walls, and the dry and wet culverts.

Sources

Buchanan, D. 2007. "Under the Boardwalk – Case History – St. John's Sideroad at the McKenzie Wetland, Aurora, Ontario, Canada." In Proceedings of the 2007 International Conference on Ecology and Transportation, edited by C. Leroy Irwin, Debra Nelson, and K.P. McDermott. Raleigh, NC: Center for transportation and the Environment, North Carolina State University. 100-113.

Figure 5.5 – St. John's Sideroad (Buchanan, D. 2007)

5.4.2 Long Point Causeway Improvement Plan

Overview

The Long Point Causeway Improvement Project is a proposed 3.5 kilometre causeway expansion in southern Ontario that will connect the Long Point Peninsula to the mainland. It is still in the initial design stages, but concern over its environmental impacts has initiated a proposal from EcoPlans Ltd that attempts to preserve the area's hydrological connections, reduce wildlife mortality, enhance road safety and recreational opportunities, and preserve the area's rural character.

Key Elements

- System of culverts and bridges, called ecopassages, that are integrated with walls and fencing to funnel animals off the roads and through corridor connections (designed to maximize use by key animal species)
- Openings to allow water exchanges
- Habitat enhancements to discourage animal movement across the road

- Integration of construction with multi-use biking/walking trail and viewing platforms
- Incorporation of signage and traffic calming measures such as warnings, seasonal speed reductions, rumble strips, and increased alternative road users
- Monitoring program with proposed links to universities, colleges, and conservation organizations

Implementation

This project is still in its design and environmental assessment stages. Partnerships play a key role in its progress, and hopefully its success. A steering committee has been created, which includes conservation organizations, all levels of government, and business and community organizations to help guide the project. Financial contributions will come from the federal and provincial governments, private sector, and conservation organizations.

Key Lessons

The environmental concerns are relatively similar, although the Frontenac Institution Lands may have a larger focus on bird protection. Some of the most applicable features include integrating road construction with increased bike and pedestrian access in area, and creating relationships with nearby groups to monitor environmental impacts (such as St. Lawrence College, Queen's University, or the Kingston Field Naturalists). Also relevant are the ecological design considerations such as ecopassages, water exchanges, and restoring and enhancing suitable habitat to encourage animal movement away from road.

Sources

Long Point World Biosphere. 2008. "Long Point Causeway Improvement Project." <http://longpointcauseway.com/index.php>.
EcoPlans Lmtd. 2008. "Long Point Causeway Improvement Plan." Prepared for Long Point World Biosphere Reserve.

5.4.3 Cobalt Constructed Wetland Wastewater Treatment System

Overview

In 2000, the Town of Cobalt, ON, implemented a constructed wetland sewage treatment system to handle their municipal wastewater. The idea to use this technology came from the development of an alternative as part of the Environmental Assessment process.

Key Elements

- Naturally functions as a filtration system in the landscape. Principal processes in wetland systems include sedimentation, filtration, adsorption, chemical precipitation, decomposition and degradation of material by microorganisms
- An important co-benefit of constructed wetlands is the wildlife habitat that is created in the process. Wetlands support a diversity of plant and animals species and act as a carbon sink
- Constructed wetlands are particularly suited for small-scale applications such as treating sewage from small, rural communities,

storm water treatment, runoff from large farming operations and some industrial waste waters including acid mine drainage
- Utilizing natural processes, constructed wetlands create low energy requirements
- Constructed wetlands are an ideal technology for these types of applications due to their low cost of construction, operation and maintenance in relation to other wastewater treatment alternatives

Implementation

The decision to use constructed wetlands for sewage treatment in Cobalt was the result of alternatives brought forth through an environmental assessment process. The project was partially financed through provincial grants with the initial capital cost being $3.9 million, excluding improvement costs. The site is being used as a model for constructed wetland use in extreme cold climates and is continually monitoring and improving this technology.

Key Lessons

The use of a constructed wetland for wastewater treatment has reduced construction, operation and maintenance costs by approximately $300,000 annually in Cobalt. By integrating a similar system for stormwater management, increased demand on existing stormwater systems in Kingston could be reduced. The system in Cobalt has performed better than expected. The water quality data of the first five years of operation indicates loading of biological oxygen demand (BOD) and total suspended solids (TSS) were less than objective targets. They also witnessed air quality improvements through reduced use of energy and chemicals associated with traditional sewage treatment plants

Sources

Town of Cobalt. Wetlands. <http://www.cobalt.ca/index.php/wetlands>.
Ministry of Municipal Affairs and Housing and OPPI. 2009. *Planning by Design: Healthy Communities Handbook*.

5.4.4 Central Park, Davis, CA

Overview

Central Park is located within the downtown core of Davis, California, a university town of approximately 64,000 people. The site covers approximately 2.3 hectares. Within the park are a number of different design features such as a landscaped park, recreational fields, community and native plant gardens, and a farmer's market. The mix of uses, including commercial (farmers market), recreational, community gardens, and open space, attract a variety of users.

Key Elements

- The farmer's market is a major draw of the park. Produce from local farmers and the community gardens are sold on site
- Significant community consultation ensured park met community needs
- Use of native plant landscaping to reduce the amount of care and irrigation needed.
- Community garden plots are managed by a community volunteer group and gardening workshops are offered

- Public art showcased
- Community events including "Picnic in the Park" and "Movies in the Park", which are well attended and bring the community together.

Implementation

The plan and design of the park took place over two years with extensive community consultation. The cost of expansion of the park to its current size was approximately $1million. The annual maintenance costs is approximately $35,000 per year, and primarily funded through the city's budget. The park is managed by the City of Davis, the Davis Farmer's Market Association manages the Farmer's Market, and the public gardens are managed by a volunteer steering committee of community members.

Key Lessons

Davis, California, is a university town. However, the park attracts over 7,000 users (over 10 percent of the town's permanent population) on summer market days. The park integrates cultural, social, economic, and environmental elements. Public art, community gardens, a permanent farmer's market, a water park, and a native plant garden are all incorporated into the design of the park to attract a variety of users and encourage community involvement. The park hosts successful special events such as movies and picnics. The farmer's market draws a large crowd as well making this park a destination for visitors.

Sources

Davis Community Network. Central Park Gardens. <http://www.centralparkgardens.org >

City of Davis. 2007. General Plan: Parks, Recreation and Open Space. <http://cityofdavis.org/cdd/gp/005-09-Parks-and-Open-Space.pdf >

City of Davis. 2009. Parks and Facilities. <http://cityofdavis.org/cs/facility/details.cfm?id=19405321-5308- 4C5D-9AB83D85B5B4AB81&type=Park>.

Project for Public Spaces. 1999. Community Defines a New Model for a Park: An Urban Parks Institute Success Story Davis, California. http://www.pps.org/topics/community/comm_plan/success_davis>.

Figure 5.6 - Central Park Features (City of Davis, 2009)

5.4.5 Gunma Insect World

Overview

This 48 hectare site was developed with the intent to better preserve the union of living with nature called "satoyama." It is a nature conservation and ecological education project.

Key Elements

- Mixed use of farmland, ecological sanctuary, museum for insects, research facility, walking trails, and educational centre (to learn of farming culture and the natural world)
- Children are encouraged to catch and observe insects in the open areas
- There is a centre for the protection of endangered Japanese butterflies
- It looks to be an eco-tourist destination
- Good public bus access, public parking available, about a thirty-minute walk to the train station
- The main architecture was designed by the world renowned Ando Tadao
- In close proximity to woodlands and woodland walking trails

Implementation

Initiated, developed, and run by Gunma Prefecture. The plan took hold in 1995 and the office of construction was opened in 1997. There were ten years of meetings with field staff and citizens of Gunma Prefecture. They reformed the area to encourage the growth of native plant life with the intent to bring back the insects natural to the area. The project was completed on August 1, 2005.

Key Lessons

Gunma Insect World creates a model for a viable eco-tourist and educational destination that works to restore the native population of plants and insects while restoring the cultural norm of satoyama. It also does so in a patient manner with great appreciation for the comments of the citizens of Gunma.

Sources

Gunma Insect World. <http://www.giw.pref.gunma.jp/english/index.html>

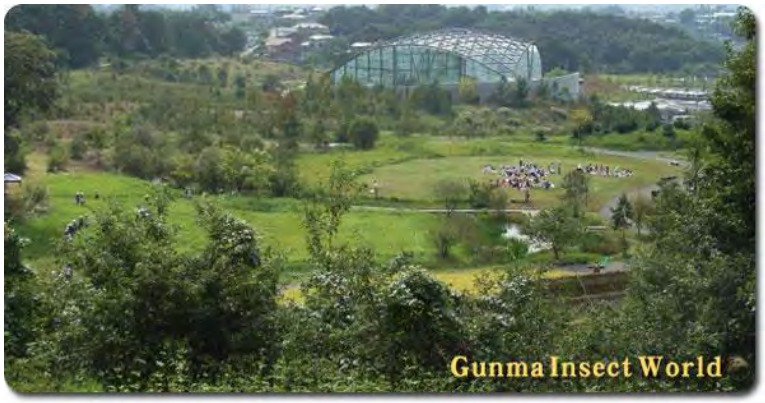


Figure 5.7 – Gunma Insect World (Gunma Insect World website)

5.4.6 The Kortright Centre

Overview

The Kortright Centre for Conservation is located in Woodbridge, Ontario just outside of Toronto. This site is one of Ontario's premier environmental and renewable energy education and demonstration centres. Situated on 325 hectares of woodlands the centre hosts 135,000 visitors annually and offers over 50 environmental education programs for schools and 30 sustainable technology workshops for the public, trades and professionals.

Key Elements

- A 1.6 kilometre trail links a variety of demonstrations on renewable energy, energy efficiency, wastewater treatment and sustainable building design.
- The Toronto Region Conservation Authority works with private and public partners with an interest in the protection of the natural environment (i.e. Bullfrog Power, Earth Rangers, CMHC, Ducks Unlimited, Environment Canada, etc)
- The centre rents rooms for weddings, corporate events, and other functions

Implementation

The Kortright Centre was opened in 1979 and is named after Dr. Francis H. Kortright, world-famous outdoorsman, author and dedicated conservationist. The key to its success has been its proximity to the population of the Greater Toronto area and the many partnerships it has established over the years.

Key Lessons

This site is similar to the Frontenac Institution Lands in its connection to the Conservation Authority (Toronto Region). Given that the adjacent lands to the Frontenac Institution are owned by the Cataraqui Conservation Authority, combined with Kingston's goal of being one of the continent's most sustainable cities, a centre (or aspects of) similar to this could be considered on the lands.

Sources

The Kortright Centre for Conservation website. <http://www.kortright.org >

5.4.7 Eishin Gakuen

Overview

Modifying farmlands (primarily tea farming) to create a unique educational facility. Eishin Gakuen is a private high school and college campus that was designed with appreciation for the natural features and history of the site. It is located 90 minutes by train from Tokyo and is walking distance from the station.

Key Elements

- It maintains agricultural uses on the property
- There is a large pond in the area that is a celebrated natural feature
- Pedestrian friendly
- The primary architect was world renowned Christopher Alexander and was developed in conjunction with his unique vision of place and place making

Implementation

This project involved relocating the school from a congested cityscape. Completed in 1985 and funded through the school, Eishin Gakuen was developed through rigorous consultations with various stakeholders (teachers, board members, students). Part of the consultation was utopian visioning.

Key Lessons

The Eishin Gakuen teaches how to modify an agricultural property into a mixed-use facility while improving the integrity of the natural landscape. It also illustrates a site design that works to calm and inspire those who use it.

Sources

Alexander, Christopher. 2005. The Nature of Order, 4 vols. Berkeley: Center for Environmental Structure.

Center for Environmental Structure. 2006. <http://www.patternlanguage.com.>

5.5 CONCLUSION

This case study review presents a number of innovative design and implementation tools for urban sustainable development.

The green design case studies demonstrate possibilities in energy efficiency, water management, and low impact design. They show how it is possible to construct a residential development that has a minimal impact on natural areas and on the broader environment. They also demonstrate the importance of partnerships, commitment, and green design champions in creating this type of development.

The agricultural case studies presented a number of ways that urban agricultural can work in conjunction with a city. For example, Harvest, The Southlands, and Prairie Crossing demonstrate the potential of agricultural uses in complimenting and supporting residential development. The other studies suggest alternative agricultural models, and how farmland can be used for education, research, and as a tourist destination.

Finally, the infrastructure case studies present a number of innovative options for the site. The Long Point Causeway Plan and St. John's Sideroad demonstrate ways that roads can be designed to benefit the community with minimized impacts on sensitive areas. Gunma

Insect World and the Kortright Centre are successful models of education centres. Finally, the Cobalt Constructed Wetland demonstrate how a constructed wetland can be used to treat sewage, Central Park presents an integrated farmer's market and community garden, and Eishin Gakuen offers an example of how design can work with the existing landscape.

Combined, all the case studies present interesting and innovative options for the Frontenac Institution Lands. In conjunction with the stakeholder workshop in October 2009, they inform the two concept plans our group developed.

6.0 The Green Community Concept Plan

6.1 VISION

6.1.1 Introduction

The green community concept plan evolved out of the results of the environmental case study scan and the stakeholder workshop held in October 2009. One of the workshop group's visions was to incorporate sustainable residential intensification with recreational opportunities and green industry, while maintaining the integrity of the adjacent wetlands.[4] The following concept accommodates a significant portion of Kingston's forecasted population growth, and takes advantage of the site's close proximity to current business and commercial centres, as well as the surrounding infrastructure. Sustainability is addressed throughout this concept in a number of ways.

6.1.2 Vision Statement

Cultivate a leading edge green residential community integrated with environmental restoration objectives, facilitating greater interconnectedness between our natural systems and community.

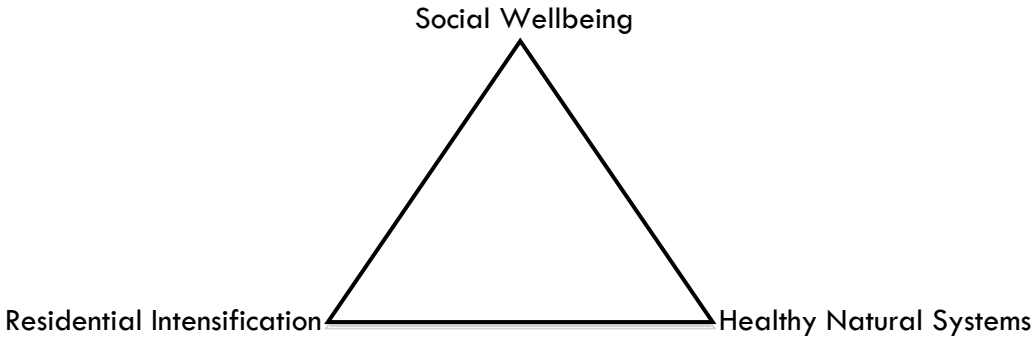


Figure 6.1 – Illustrates the triangulation of goals captured in the concept's vision statement

[4] Green industry was not included in the final concept, as research suggested that Kingston currently has no need for additional industrial-zoned land (Refer to Section 3.5)

6.1.3 Rationale

In the next 17 years, it is forecasted that Kingston's population will grow, and new approaches to residential development must be considered to accommodate this growth sustainably. With its naturally occurring wetlands, location within the existing urban fabric, and close proximity to local and downtown commercial and employment centres, the Frontenac Institution Lands could represent an exciting opportunity to showcase sustainable residential development to the rest of Canada and the world.

A sustainable community recognizes the need to maintain and enhance the social, cultural, economic and environmental interconnections and interdependencies of the community, within the ecological limits of the urban boundary, for future generations. A forward thinking and integrated approach to planning for sustainability mitigates the negative impacts of community growth, while enhancing the positive aspects that exist.

Several policy documents support the development of the site for residential use. The Provincial Policy Statement (2005) promotes the development of healthy, livable, and safe communities throughout Ontario. It promotes efficient land use patterns that accommodate a mix of uses, avoid negative environmental impacts, minimize land consumption, and ensure that infrastructure can meet future needs. It also promotes the development of affordable housing, healthy and active communities through the provision of open space, the effective planning of developments to support transit and other forms of alternative transportation, and energy efficiency and alternative energy development.

The City of Kingston's Urban Growth Strategy (2004) outlines recommended areas to accommodate future population growth in Kingston. The document lists the Frontenac Institution Lands as a potential area of development intended for population and employment growth. The site was determined to be the most central of the growth alternatives, and can be serviced by existing infrastructure including roads, transit, adjacent commercial, and water and sewer services. It is also adjacent to Little Cataraqui Creek and could provide access to an attractive natural heritage resource.

After extensive public consultation, the City of Kingston's Adopted Official Plan (OP) (2009) reflects a collective desire to build a more sustainable future for the Kingston community. A strong emphasis on sustainable development within the urban boundary is apparent throughout the plan. Kingston's population is forecasted to grow by a medium projection of 15,900 people in the next 17 years, who will require 13,300 new residential units (Thurston, 2008). The Frontenac Institution Lands could be used to accommodate a portion of this growth close to the downtown core.

The Adopted OP (2009) outlines several aspects of sustainable development such as the provision of affordable housing, efficient use of infrastructure, and the use of green building features in new developments. It emphasizes innovation in energy efficiency, density designations, public transit, open space protection, and in providing community gardens, and educational, recreational, and cultural opportunities. The city's sustainability program encourages large-scale developments that provide for a mix of uses and create complete neighbourhoods, including smaller dwelling units to accommodate predicted smaller household sizes. There is also a desire to develop neighbourhoods that facilitate a decreased reliance on the automobile. The proposed concept plan attempts to go beyond these directives and recommends an enhanced sustainable community.

6.2 DESIGN

6.2.1 Overview

The following land use map (Figure 6.2) was developed based on stakeholder consultation, research and discussion with experts.

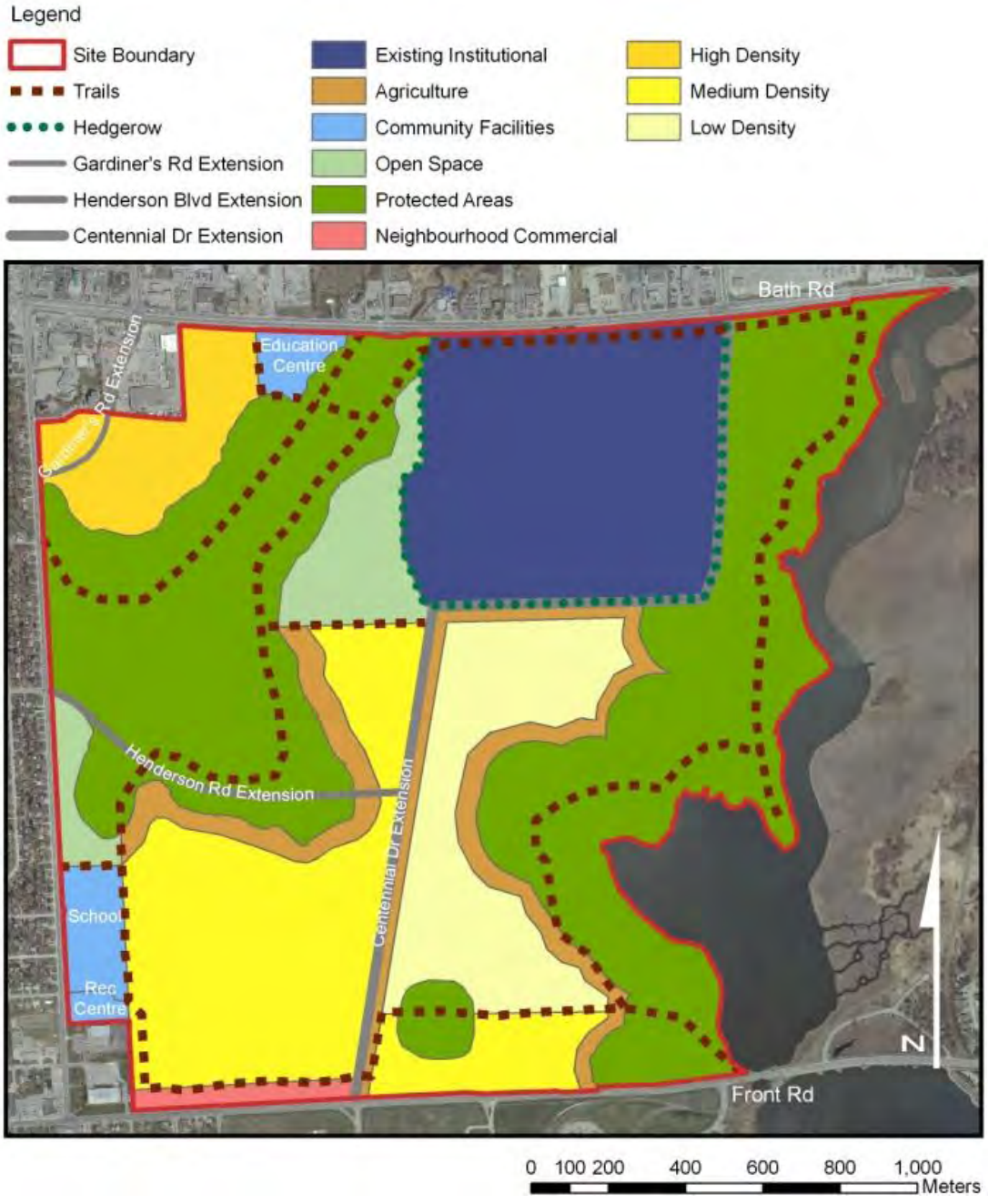


Figure 6.2 – Green Communities Concept Plan Map

The map displays proposed and existing land uses for the site. Table 6.1 describes the proportion of the site area devoted to the different land uses.[5]

Table 6.1 – Land use break-down of the Green Community Concept Plan

Land Use	Hectares	% Land Use
Protected Area	146	49
Residential	105	35
Agriculture	22	7
Open Space	15	5
Community Facilities	9	3
(Educational Centre)	(3)	(1.0)
(Elementary School)	(5)	(1.7)
(Recreational Centre)	(1)	(0.3)
Neighbourhood Commercial	3	1
Total Site	**300**	**100**

Residential development makes up approximately 35 percent of the site. This is balanced by a combination of over 60 percent protected areas, agriculture, and open space that help protect the existing ecological features and functions. These uses can be thought of as transitional areas that naturally buffer the wetland from the new communities (see figure 6.3 for an illustration of the buffer system).

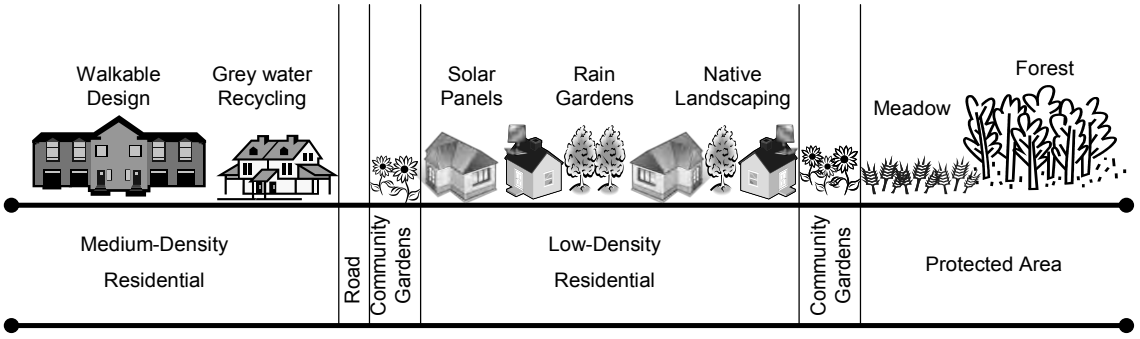


Figure 6.3 – Transect line through Sustainable Communities Concept Plan

For example, the forested area immediately surrounding the wetland is fully protected, with limited access via a boardwalk system. This area transitions into a managed meadow habitat that is also protected, and preserves the habitat value of the existing farmlands while providing for natural forest succession. Adjacent to the meadow is a strip of agricultural land devoted to small-scale community gardens. These gardens provide a soft boundary against encroachment into the protected area, and could also function as wildlife gardens for the many butterfly and dragonfly species found on the site. Finally, the residential communities transition through lower densities to higher densities as you move further away from the wetland. These communities are further integrated through

[5] Site Area is considered as total area within the site boundary, less the land devoted to the existing institutional use (penitentiary + 200 metre buffer)

green design features such as native landscaping, rain gardens, and solar panels. Figure 6.4 is a rough sketch of how the transition between residential, agricultural, and protected meadow could look.

Figure 6.4 – Transition between low-density residential, agriculture, and protected meadow

The residential portion of the concept plan consists of three different density mixes based on Kingston's projected housing needs. In total, the residential portion of the development provides almost 7,500 units, or housing for 56 percent of Kingston's anticipated population increase.[6] The following table (table 6.2) provides a break-down of the residential mix and the expected number of units from each density.

Table 6.2 – Residential break-down of the Sustainable Communities Concept Plan

Residential Density (gross)	Hectares	% Total Residential	Projected Units
High Density (200 du/ha)	16	15%	3,200
Medium Density (65 du/ha)	59	56%	3,835
Low Density (15 du/ha)	30	29%	450
Total Residential	**105**	**100%**	**7,485**

Approximately 29 percent of the development is low density, with a suggested target of 15 du/ha (see figure 6.5 for an example of 15 du/ha gross density). This is below Kingston's projected needs for low density housing, because it was felt that the character

[6] Based on the medium-level population and housing projection levels in the "City of Kingston Information Report to Planning Committee: Population and Housing Forecast Based on 2006 Census Data."

of the area would be better suited to accommodating a larger proportion of Kingston's high and medium density targets due to its proximity to downtown and public transportation; this is also an efficient and sustainable growth strategy.

Figure 6.5 – Detached and semi-detached housing examples (15du/ha density) (City of Ottawa, 2004)

Consequentially, the site accommodates all of Kingston's projected needs for apartment housing, based on a mix of high density mid-rise apartment towers and medium density garden apartments (see figure 6.6 for an example).[7] The remaining medium density mix accommodates all of Kingston's attached housing projections, with an additional 1,135 units that could be designated as either single-family or attached. As a result, a mix of garden apartments, attached housing, and single family housing are the recommended approach to meeting the medium density target of 65 du/ha (see figure 6.7 for an example of high density). This flexibility allows for adaptation to a changing market, particularly to increasing preferences for attached housing (Thurston, 2008).

Figure 6.6 – Attached, stacked, and row housing examples (65du/ha density) (City of Ottawa, 2004)

The site also includes affordable and rental housing for low income residents. The City of Kingston OP has set a target that 25 percent of all new housing units must be affordable. In keeping with this target, the development on this site aims to have 10 percent of units offered as affordable rental housing, and a further 15 percent offered as affordable ownership for medium to low income residents. These targets specifically focus on bachelor and one-bedroom apartments to accommodate the ageing population, which is expected to grow by 10,000 people by 2030 (Grange, 2005). Affordable and rental units should be interspersed throughout the development to encourage a diverse social mix.

[7] Based on the medium-level population and housing projection levels in the "City of Kingston Information Report to Planning Committee: Population and Housing Forecast Based on 2006 Census Data."

Figure 6.7 – Low and mid-rise apartment examples (200 du/ha density) (City of Ottawa, 2004)

6.2.2 Illustrated Design Features

The following collages illustrate the features and approach this concept takes. They are a visual compliment to the elements described in detail in Section 6.3. To re-iterate, this is not a design exercise and the images provided only intend to provide a sense of what can be accommodated on the site.

6.2.2.1 Protected Area Features

Observation Tower

Wetland Protection

Eco-Passages to mitigate wildlife impacts

Figure 6.8 – Protected Area Features (Note: image sources at end of document)

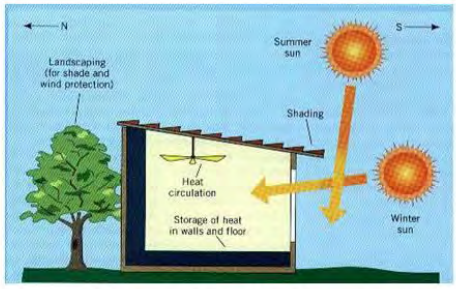
6.2.2.2 Residential Features

Proposed Residential

Detached Residential

Attached Residential

Mid-Rise Residential



Energy Efficiency through solar orientation

Figure 6.9 – Residential Features (Note: image sources at end of document)

6.2.2.3 Agricultural Features

Edible Landscaping

Community Gardens

Agricultural Transitions from residential to protected areas

Figure 6.10 – Agricultural Features (Note: image sources at end of document)

6.2.2.4 Facility and Infrastructure Features


Bike Lanes


Education Centre


Stormwater Swales


Recreation Centre


Transit facilities

Figure 6.11 – Community Facility and Infrastructure Features (Note: image sources at end of document)

6.3 PROPOSED APPROACH

In order to realize this vision of a sustainable community, key features of the site development are outlined below, categorized by land use.

1. Residential
2. Neighbourhood Commercial
3. Community Facilities
4. Agriculture
5. Protected Areas and Open Space
6. Transportation

6.3.1 Residential

Green Buildings

Green building design and construction is used throughout the site, with LEED gold certification as a minimum standard for all residential buildings. Energy efficiency is achieved through the use of direct gain passive solar heating, shade trees in landscaping, green roofs, and solar panel installation. Further energy efficiency is achieved through proper insulation and double paned windows. Construction materials are accessed or reclaimed locally as much as possible. Energy star appliances are included within residential units to minimize energy consumption. All new public infrastructure, such as streetlights, traffic lights, and water and waste water pumps are also energy efficient in their design and operation.

Healthy Buildings

Low or no volatile organic compounds (VOC's) paints, sealants and adhesives are used in all developments, while urea-formaldehyde composite wood products are avoided. One hundred percent fresh air ventilation systems are in all buildings and use heat recovery from exhaust systems to preheat incoming air.[8]

Grey Water Recycling

Grey water from all residential buildings is captured and treated on site and then redistributed for use in toilet flushing and landscape irrigation.

Recycling and Composting Stations

All apartment and condominium buildings have access to recycling sorting stations and composting facilities within walking distance. These stations facilitate recycling and composting for residents without roadside pickup. An agreement with the City of Kingston ensures pick-up from these locations.

Affordable Housing

The development accommodates a full range of housing, including affordable rental housing for low income residents. Ten percent of units are affordable rental housing, and another fifteen percent are affordable ownership for medium to low income residents. These units are interspersed throughout the development to encourage a diverse social mix throughout the property.

[8] Dockside Green uses this technology in their development. For more information see their report: Our Triple Bottom Line: Green Initiatives.
http://docksidegreen.com/images/stories/sustainability/overview/greeninitiatives.pdf

Tree-lined Streets

Trees line the streets throughout the development to reduce the heat island effect, improve air quality, increase transpiration, and reduce the cooling loads of buildings.

Edible Landscaping

Edible landscaping, also known as permaculture (see figure 6.8), provides food for residents and wildlife. It also fosters community partnerships, shared community resources, and promotes local and sustainable sources of food.

Permaculture

Permaculture is an approach to designing human settlements with perennial agriculture in an attempt to mimic relationships found in nature. It is an effort to create more self-sustaining settlement environments through a core set of design principles that create aesthetically pleasing and edible landscapes.

Source: Eugene Permaculture Guild, http://www.eugenepermacultureguild.org/main/?page_id=11

Figure 6.12 – Permaculture text note

Walkability

Easy street crossings, sidewalk continuity, and greenery buffered right-of-ways increase the sense of safety and provide pleasing aesthetics for pedestrians. Clustered development with easily accessible goods and services also promote pedestrian and cycling trips, and supports car-free living. Secure and accessible bike storage is available for all dwelling units and at all amenity locations.

Lighting

Energy efficient street lighting considers pedestrian safety and comfort. Special design considerations are used to minimize light pollution on the wetland.

Community Connectivity

The residential areas are designed to encourage and facilitate pedestrian traffic within and through the developments and broader community. Streets, pathways, and amenities are easily accessible to the residents of the new developments and also to those in surrounding communities. Interconnecting grids of local streets and alleyways encourage pedestrian and bicycle traffic through the area, and enable the addition of transit service. [9]

Community Connections

The residential areas also promote the social aspects of connectivity by encouraging community building and interactions through community gardens, shared facilities, and inviting public spaces.

[9] A minimum of 225 intersections per square kilometre should be designed according to the Congress for the New Urbanism, Natural Resources Defence Council, and the U.S. Green Building Council. *LEED 2009 for Neighbourhood Development Rating System*.

Natural Storm Water Management

Low impact development that mimics a natural hydrologic regime is implemented within the development site. The use of rain gardens along paved areas (see figure 6.9), pavers instead of asphalt, and open conveyance of stormwater along lot lines and greenways increases the natural infiltration of rain water and runoff. Green roofs decrease runoff rates during storm events, and the demands on surrounding traditional stormwater management systems.

Rain Gardens

Rain gardens are landscaped areas adjacent to impervious surfaces or roof drainage systems that receive runoff from roadway and parking or roof drainage. Features include amended soils, appropriate plantings, and drainage overflow features.

Source: Eugene Permaculture Guild, http://www.eugenepermacultureguild.org/main/?page_id=11

Figure 6.13 – Rain Gardens text note

Constructed Wetlands

Artificial wetlands are constructed adjacent to the present wetlands. Artificial wetlands are operationally less expensive than traditional stormwater management systems, and help alleviate pressure on infrastructure. Wetland sewage treatment is also considered for the site.[10]

Respect for topography

The development integrates the site topography into its design to limit the disturbance to the ecological functioning of the property. An erosion and sedimentation plan is developed prior to starting development activity to identify and implement mitigation strategies before, during and after construction activities.

6.3.2 Neighbourhood Commercial

Mixed Use

Neighbourhood commercial space is integrated into the new proposed community. It provides employment opportunities, discourages car use, increases connectivity, and creates mixed use neighbourhoods. All commercial space includes second storey apartments.

Access

Commercial space is located in the south of the site to provide local services to residents further from the existing commercial activities. Parking is minimized, to encourage local use and alternative forms of transportation. To compensate, services are placed with easy access to public

[10] Constructed wetland systems have been successfully implemented in Ontario. See Cobalt, ON case study. For more information see http://www.cobalt.ca/index.php/wetlands

transportation and the new trail system, to provide a variety of access points and modes.

Local focus

Shops meet the daily needs of the community and focus on essential services, such as grocery stores, post offices, dry cleaners, day care centres, and restaurants. Where possible, local businesses and businesses that source from local suppliers are prioritized via incentives. Other partnership opportunities, such as a local farmer's co-operative are also be possible.

6.3.3 Community Facilities

Education Facility

An educational facility enhances the tourist-draw of the area, and provides a venue for wetland-themed education and outreach. The centre is multi-purpose, with a dual focus on Kingston tourist attractions and wetland education. It is situated at the top of the rise in the northwest corner of the site to take advantage of the location's prominent presence and access from both Bath and Days Road. This provides a vista over the entire site, and minimizes the impact visitors may have on the Little Cataraqui Wetland. Instead, visitors can view the nearby restoration work on the west branch, or use spotting scopes to unobtrusively observe wetland birds. The new trail network also allows adventurous and interested visitors access to the larger wetland.

Recreation Centre

A new recreation centre is located next to the existing curling and hockey arena complex, and integrated with the new elementary school. This increases the recreation-draw of the area, and ties into both the new trail system and the existing Waterfront and Rideau Trails. This centre targets recreation activities such as cross-country skiing, snowshoeing, and biking.

Elementary School

Space for a potential elementary school is provided, if the increased population creates enough demand. It is integrated with the new recreation centre, and with nearby open space that could be used as a soccer field. Sharing space with the recreation centre creates a site that is active in the day time, evenings, and on weekends. The school is constructed using green design elements. If no school is needed the space could be converted into more residential or open space.

6.3.4 Agriculture

Community Gardens

Community gardens act as a buffer between the protected areas and the residential communities, provide an urban food source, and help foster a sense of community. Small garden plots are available to all Kingston community members, and accessed through residential roadways and the multi-use trail system. Larger plots, located on the west side of the site, are available for partnerships with educational institutions and for community

programming that promotes healthy eating.[11] Organic methods are encouraged to protect the wetlands, and small-scale rain capture is used for irrigation. Where possible, the gardens are integrated with the grey water recycling system to reduce overall water consumption.

6.3.5 Protected Areas and Open Space

Protected Areas

Protected areas include the wetlands, existing tree clusters, and other sensitive ecosystems. The only use allowed in these areas is trails, subject to environmental impact statements that ensure there are no negative impacts to the protected features. Some of the area that is designated as protected includes farmed fields. These fields are managed as meadows to transition their current use within a natural succession process.

Open Space

Open space is used for recreation features that are environmentally responsible, accessible, and appropriate to the needs of the community. One identified use is a soccer field. Other uses include playgrounds, landscaped gardens, wildlife gardens, and additional community gardens.

Trails

An extensive loop trail system connects to the Waterfront Pathway and Rideau Trail, and is accessible wherever possible. It emphasizes passive recreational activities such as walking, cycling, snowshoeing, and skiing. Its location is subject to an environmental impact statement that ensures that sensitive areas are not negatively impacted. Trail features include educational signage, viewing platforms, sculpture, warming huts, and outdoor fitness equipment. The trail engages the community and tourists with the natural landscape, incorporates options for sustainable transportation, and provides a premier recreational experience.

Boardwalks

Boardwalks represent a major feature of the trail system, particularly in ecologically sensitive areas. They are integrated with conservation efforts that preserve and protect the site's Provincially Significant Wetlands and sensitive species.

6.3.6 Transportation

Road Extensions

A major feature of the site is the extension of Centennial Drive, Henderson Boulevard and Gardiners Road. These extensions are consistent with the City of Kingston's Official Plan. Extending these roads is necessary to provide access to the site, and support the other residential, commercial, and recreational activities.

[11] For more background on community garden management techniques please see the "Agriculture and Communities" case study section, with particular emphasis on Village Green's local community gardens and UBC Farm's community programming partnerships.

Low Impact Design

Road extensions include best practice road design to minimize their impact on the surrounding features. Vertical wall construction reduces the road construction footprint and potential animal mortalities. The addition of dry "eco passages" provide opportunities for the site's turtles, snakes, and small mammals to safely cross the road (see figure 6.10). In some areas, particularly the Henderson Boulevard extension, wet culverts are also considered, to maintain the integrity of the existing water connections and functioning. In addition, restoration work mitigates some of the negative impacts of the road construction.

Eco-Passages

Source: EcoPlans 2008. "Long Point Causeway Improvement Plan."

"Wildlife crossings, termed "ecopassages," [are] a growing trend used to mitigate the effects of roads on wildlife. The *ecopassage system* consists of two elements:

1) a series of passages (culverts and/or bridges) designed to facilitate safe movement of wildlife under the roadway; and

2) a continuous funnel system (wall or fence) that prevents wildlife from entering the roadway and directs wildlife toward the passages." (p.9)

Figure 6.14 – Eco-Passages text note

Public Transit, Cycling, Walkability

Both road extensions include provisions for alternate forms of transportation such as safe and aesthetically pleasing corridors for pedestrians and cyclists. Bike paths are also extended along Front and Bath Roads for the length of the site. Integrating these features early in the design minimizes their costs, and provides a legacy of site accessibility. The Centennial Drive extension also includes a re-routing of the Kingston Transit System, to allow better access to the residential and recreational facilities on the site. Safe and comfortable waiting areas are provided along the route, along with shelters for all current bus stop locations. Viewing platforms are integrated with some of the stops and create opportunities to appreciate the wetland and site landscape.

6.4 IMPLEMENTATION TOOLS

The review of literature, best practices, professionally accepted standards, and effective programs in other international sustainable communities identified a wide range of implementation tools that could be used to develop a sustainable community on the Frontenac Institution Lands. These tools are based on existing green standards and international best practices, as reflected in our selected case study analysis.

Below is an implementation plan, including collaborative and financial tools, for the Green Community Concept Plan. The program combines regulations, public investments, pricing and taxing policies, in addition to actions that the community may implement to achieve leading edge sustainability goals.

6.4.1 Collaborative Tools

Showcase Green Design Innovations

Innovations in green design should be showcased with the Kingston Sustainability Centre in order to educate the public and development community about green design successes.

Green Design Champion

A champion for green design should be identified within the Kingston development community who can lead the discussion on green design within the context of Kingston and increase understanding and buy-in within the development community.[12]

Municipal Liaison Staff

A planning expert from the City of Kingston staff should be assigned the role of liaising to facilitate the leading edge sustainability plan for the Frontenac Institution Lands. This person would be an expert on all ongoing projects in the area, in addition to having expertise in sustainability.[13]

Community Liaison

The success of many of the recommended features of the site will depend on strong partnerships between various parties. It is recommended that a community group, such as the one formed for the Dockside Green development in Victoria, be formed to liaise with community members to sustain a positive relationship between the community and the private developers. This group will facilitate a two-way communication strategy to address progress and issues related to the development, while allowing for community input towards improving the development.

Environmental Monitoring Partnership

Maintaining and restoring the ecology of the site is a high priority, and an environmental monitoring and evaluation team should be developed to research and monitor the impacts before, during, and after the development process. This team could consist of members from the academic community of Kingston, the CRCA, Kingston Wetlands Working Group, and the Kingston Field Naturalists group, therefore bringing various types of expertise to the group.

[12] This initiative was proposed during the stakeholder workshop on December 9, 2009.
[13] This technique was used to facilitate the planning and development of Dockside Green.

Community Harvest Partnership	The local food movement in Kingston can be supported within the development by the use of permaculture. A community group could be formed to help with harvesting this produce and encouraging donation of excess produce to the Kingston Food Bank or other charitable agencies.[14]
Trail Network Partnerships	The proposed trail system should connect with nearby regional trails such as the Waterfront trail and the Rideau Trail. Partnerships could be sought with the Waterfront Regeneration Trust and the Rideau Trail Association to assist in identifying volunteers for trail maintenance and educational programming. To facilitate the use of the trail system throughout the year, rental equipment, such as cross-country skis or snowshoes could be made available from the recreational facility.
Public-Private Non-Profit Housing Partnerships	A sustainable community needs to encourage a mix of ages and incomes living within a development. In order to encourage affordability for this social mix, an affordable housing strategy needs to be in place. A non-profit housing provider should be recruited to purchase and manage the non-market rental units. The affordable ownership units should have a market affordable restrictive covenant put in place to ensure affordable units remain affordable over time. The administration of these covenants could be linked to the non-profit housing provider.[15]
Education Programming	Within the educational facility, education programming should target youth, development industry, government employees and released inmates to train the community on sustainable planning for sensitive ecosystems.
Private Investment for Public Facilities	Corporations such as DuPont have shown interest in the site by donating valuable industrial zoned lands to the CRCA for protection. Further involvement could be pursued during development of the site through sponsorship opportunities in environmental protection or public facilities.[16]
First Nations Collaboration	Local First Nations should be consulted proceeding the divestment of the federal lands and throughout the development process in order to ensure traditional land uses are identified and integrated into the development plans of the land.[17]
Zoning Amendments	The City of Kingston should pursue zoning amendments for the proposed protected areas to ensure that they remain protected and are not encroached upon by development on the site.

[14] An interesting precedent is the Green Harvest Program in McKeesport, Pennsylvania, which is a partnership with educational institutions, local community service volunteers and the Food Bank that was established to harvest food from various sources in their community.
http://www.sustainable.org/casestudies/SIA_PDFs/SIA_Pennsylvania.pdf

[15] Dockside Green's Affordable Housing Strategy recommends these practices to ensure affordability within their development.

[16] This initiative was proposed during our stakeholder workshop on December 9, 2009.

[17] Ibid.

6.4.2 Financial Tools

Leasable Community Space

To help finance the educational facility, there should be a leasable space built into the development to provide space for functions such as weddings, corporate events, or other private functions. This space could also be used for programming such as day camps and adult education programs. Using this space would help subsidize the operational costs of the facility.

Sustainability Criteria and Development Charge Rebates

There is an opportunity to integrate the approval process with sustainability guideline criteria, set by the city, which would embed sustainability practices within the development process on a wider scale. The criteria would provide incentives to developers for projects that meet or exceed minimum standards. Incentives can be in the form of development charge rebates, reduced planning permit fees, or a green building fund.[18] We recommend a municipal level incentive for developers that exceed minimum green design and sustainability standards through waiving development charges.

Triple Bottom Line Accounting

When assessing alternative proposals for the project, the environmental and social benefits must be fully accounted for. This would ensure sustainable projects acquire points for all aspects of their design, including those that are often under-stated, such as social or environmental benefits.[19]

Density Bonusing

Often used in larger municipalities, density bonusing acts to permit higher density where higher degrees of sustainability are met. With no direct cost to the City, this would facilitate higher densities and encourage sustainable design of new buildings on the Frontenac Institution lands.

Green Building Fund

An area specific green building fund would be established by the City of Kingston to help fund environmentally friendly technology for transportation and infrastructure, above and beyond the mandatory development regulations set out by the City. A proportion of the fund would be paid for by the City, as well as fees levied on developers for buildings that do not exceed green design standards. Initial capital investment in green infrastructure will be offset by the long term cost savings of responsible design, in addition to the tax base attracted by sustainable best practices.

Government Grants

Taking advantage, whenever possible, of the numerous government grants in place at various levels with regards to social housing, green technology and environmental restoration efforts would bolster the financial feasibility of the leading edge plan.

[18] See SURP 824B Project Course 2008 for a full list and discussion of these options

[19] Dockside Green's winning bid has been attributed to the inclusion of social, environmental and economic costs in the competition selection process.

6.5 NEXT STEPS

This section has described a possible vision for the re-development of the Frontenac Institution Lands, which would see residential intensification integrated with environmental restoration and protection efforts on the site, to build a leading edge sustainable community. Kingston's growing population, the benefits of integrated urban design, and Kingston's desire to be one of the most sustainable cities in the continent is the basis of the plan. The Green Community Concept Plan's approach has been to integrate the best practices in residential, social, cultural and environmental planning to suit the needs of the community within the unique context of the Frontenac Institution Lands. Implementation tools provide a means to realize the vision.

Particular phasing for the different components of the site is beyond the scope of this report. However, we would like to recommend, in general, some of the supporting studies that will need to be done to address the complexity, and limitations, of our recommendations.[20]

- Archeological Assessment(s) and Impact Mitigation Report
- Architectural Control Guidelines
- Community Services and Facilities Study
- Community consultation, focusing on within-neighbourhood design and aesthetic features
- Decommissioning Plan (dismantling and removal of equipment)
- Environmental Assessment, particularly for the road extensions
- Environmental Impact Statements for residential development and site alterations adjacent to wetlands/woodlands/sensitive species, and the trail system to determine lowest impact locations and mitigating strategies
- Financial analysis of proposed viability of green design features and affordable housing strategies
- Control plan for lot grading and drainage and stormwater management
- Engineering reports, with site morphology and site servicing recommendations. Although we anticipate that the energy efficient design, grey water recycling system, and biomass heat generation will reduce much of the site's servicing footprint, it will be necessary to assess how the remaining needs fit within the city's current capacity.
- Transportation studies

[20] See Section 9.12.3 (d.) of Kingston's Adopted Official Plan for exhaustive list of studies

7.0 The Agricultural Conservation Plan

7.1 VISION

7.1.1 Introduction

Two distinct outlooks on the Frontenac Institution Lands emerged from the stakeholder workshop. Outlined in Chapter 6 was an approach to sustainability that related to residential intensification of the lands. The following concept plan outlines another possible approach to sustainable development on the lands. These are by no means opposing plans, but each presents elements, that in conjunction with one another and possibly other additions, could present an approach to the site.

The protection of prime agricultural land and community connections are emphasized, in an attempt to foster a more meaningful connection between the people of Kingston and their food source. The Agricultural Conservation concept emphasizes the importance of meaningful and efficient use of existing prime agricultural lands and protection of water resources, whilst facilitating residential and community infrastructure.

7.1.2 Vision Statement

Protect prime agricultural land while enhancing the well-being of the site's natural systems and surrounding communities to further the sustainability motives of the citizens of Kingston.

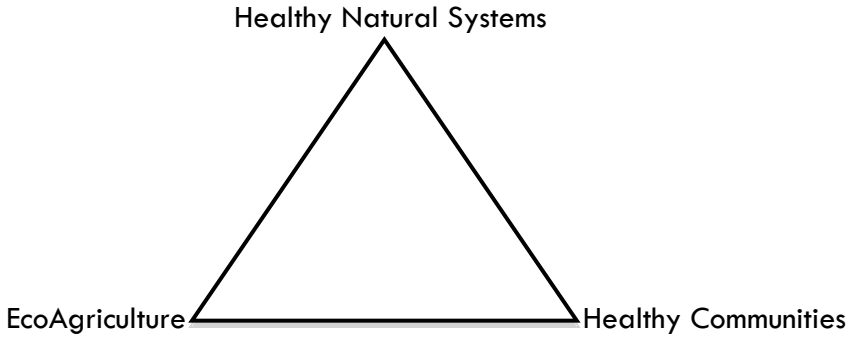


Figure 7.1 – Illustrates the triangulation of goals captured in the concept vision statement

7.1.3 Rationale

The Agricultural Conservation Concept stands out from conventional development, and some might consider it a radical approach. Global challenges, historical perspectives and local context give way to an approach to this site that prioritizes agriculture. This plan permeates that ideals of sustainability can only be achieved by ensuring agricultural conservation, benefiting the community in various capacities. Planning on the local level, although miniscule in the global perspective, cumulatively contributes to progressive sustainable planning.

7.1.3.1 Global Challenges

Global challenges are converging, threatening access to one of humanity's basic needs: food. To ensure the actions of today do not compromise those of future generations, creative solutions to retain agricultural land need exploration. A few of these converging global challenges include climate change, food security and availability issues, ecological limits of the land, obesity, population growth and peak oil. These represent major global issues, with complex interrelationships, and differ depending upon the location and socioeconomic climate. Some of these issues, such as obesity have more local-led initiatives that include a partial emphasis on food issues (MAH, 2009).

It is understood that dedicating a large tract of urban land as agriculture and promoting complimentary uses surrounding it will not combat these global issues alone. Understanding how the cumulative impacts of development affect the planet and the connections within it is a necessary element of a sustainable future. For this concept or a variant of it to come to fruition requires a giant leap of faith that it is in the public interest. Exploring this concept as a possibility does not negate conventional planning, but provides insight on the incorporation of the food system in sustainable communities of tomorrow.

7.1.3.2 Historical Perspectives

"Those who remember know that '30 or 40 years ago there was a thriving farm community on the outskirts of the then City of Kingston which provided food directly to the City to processors within the urban area.' Today that situation is much different as those farmers who remain are fewer and further between and distributors and processors are hundreds of kilometres away." (McBay et al, 2007 pg. 53).

Toronto Victory Garden in 1940 (Photo by John H. Boyd, from the City of Toronto Archives).

Victory Gardens

During World War II, disruptions of labour and transportation caused fruit and vegetable shortages in many cities. This, and a desire to keep canned foods for overseas troops, caused the government to create a program of "Victory Gardens." Everyday citizens were encouraged to plant these gardens to supplement their own food rations and to help the war effort. Tens of millions of people in the Allied nations participated.

Source: McBay et al, 2007, pg. 41

Figure 7.2 – Illustrates the triangulation of goals captured in the concept vision statement

7.1.3.3 Local Context

The location and preservation of the Frontenac Institution Lands provide a unique opportunity for creative incorporation and preservation of agricultural conservation. Kingston has a vocal agricultural community, interested in the future of this vocation and culture – particularly on these lands.

The Provincial Policy Statement (2005) and the City's Official Plan consider agricultural lands as a valued resource that in conjunction with other resources contributes to complete and functioning communities. This concept plan, which focuses on preserving the majority of the site as agricultural lands, incorporates other valued resources as identified in the Provincial Policy Statement. These resources include natural heritage, water and cultural heritage landscapes.

At the municipal level, the City of Kingston's Adopted Official Plan employs a four-pillar approach to sustainability, emphasizing "enough, for all forever." This approach encompasses varying approaches to sustaining the local community, including discussions of protecting prime agricultural land, farmland preservation and food security. The Frontenac Institution Lands offer a large continuous area of prime agricultural land within a unique urban context, and provide opportunities for ongoing education, community support and ways of enhancing local and regional food security.

Further, in an agricultural study commissioned by the City of Kingston the author noted the large land holdings in the possession of the Federal Government within Kingston. This study encouraged continued use for agricultural production and the recognition of ongoing community and garden plots to "enrich community life and provide direct contact with food production for urban residents." (Clark, 2007, pg. 23). Opportunity exists for a broader use of the lands for research, education, marketing, and distribution of produce.

7.2 DESIGN

7.2.1 Overview

The following land use map (Figure 7.2) was developed based on stakeholder consultation (See Chapter 10.2), research (See Chapter 5) and discussion with researchers, professors, planners, farmers and other professionals.

Figure 7.2 –Agricultural Conservation Concept Plan Map

The map displays proposed and existing land uses for the site. Table 7.1 describes the proportion of the site area devoted to the different land uses.[21]

Table 7.1 – Land use break-down of the Agricultural Conservation Concept Plan

Land Use	Hectares	% Land Use
Agriculture	145	48
Protected Areas	126	42
Residential	15	5
Open Space & Community Gardens	11	4
Community Facilities	3	1
Total Site	**300**	**100**

The majority of the site is designated as agriculture, whereby a variety of programming could compliment and preserve this unique occurrence of non-developed prime agriculture within the urban boundary. There are approximately 197 hectares of prime agriculture on the site. Of the 145 hectares the concept plan designates as agriculture, 129 hectares are prime agriculture. This accounts for 89 percent of the agriculturally designated lands, and 66 percent of the prime agriculture on the site. The remaining soils with prime agriculture capability are located where the open space/community gardens and agricultural education center are located. Therefore, they are still used for peri-agricultural uses. The expected yield of the 11 hectares of community gardens is about 450 tonnes of food per year (Lam, 2007). Some of the previous agricultural lands have been transformed to protected areas (especially around West Branch of the Little Cataraqui Creek) and will act as an eco-agriculture buffer to protect biodiversity and ecosystem health.

Some residential development is suggested based on the lower soil capabilities in the northwest corner of the site, and the existing commercial and residential neighbourhood uses. Table 7.2 provides a break-down of the residential mix and resulting number of units suggested for this site. This mix of housing will provide about 1,750 units, or housing for 13 percent of Kingston's anticipated population increase.[22]

Table 7.2 – Residential break-down of the Agricultural Conservation Concept Plan

Residential Density (gross)	Hectares	% Total Residential	Projected Units
High Density (200 du/ha)	6	40	1,180
Medium Density (65 du/ha)	9	60	572
Total Residential	**15**	**100**	**1,752**

Additional uses include open space and community gardens, protected areas, and community facilities. In addition, transportation elements such as the extension of Gardiner's Road, various trails throughout the site, and farm access roads are visualized in

[21] Site Area is considered as total area within the site boundary, less the land devoted to the existing institutional use (penitentiary + 200 metre buffer)

[22] Based on the medium-level population and housing projection levels in the "City of Kingston Information Report to Planning Committee: Population and Housing Forecast Based on 2006 Census Data."

the concept plan (See Figure 7.2). The concept focuses on maintaining and improving the on-site agriculture for local food production and security. Elements of these functions occur throughout the site (See Section 7.3). Emphasis is also made on ensuring minimal impact on the natural areas throughout the site. This is achieved by restoration efforts and incorporating responsible and best practice agricultural and community gardening methods that limit impact on the wetlands. Further discussion of the individual components of this concept appears in Section 7.3.

7.2.2 Illustrated Design Features

These image collages intend to illustrate the features and approach this concept takes. They are a visual compliment to the elements described in detail in Section 7.2.3. to re-iterate, this is not a design exercise and the images provided only intend to provide a sense of what can be accommodated on the site.

7.2.2.1 Trail System Features


Year-round trail usage


Consideration of low impact farm road

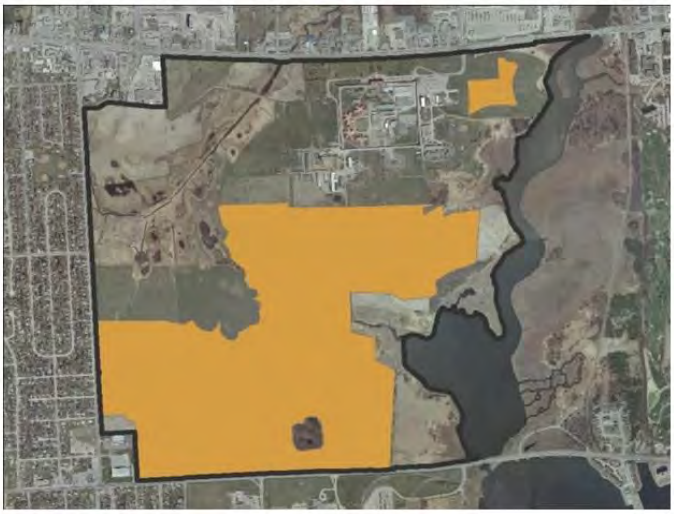

Encouragement of healthy activities


Farm Road Access


Low impact through sensitive areas

Figure 7.3 – Trail System Features (Note: image sources at end of document)

7.2.2.2 Agricultural Features



Proposed Agricultural Protection

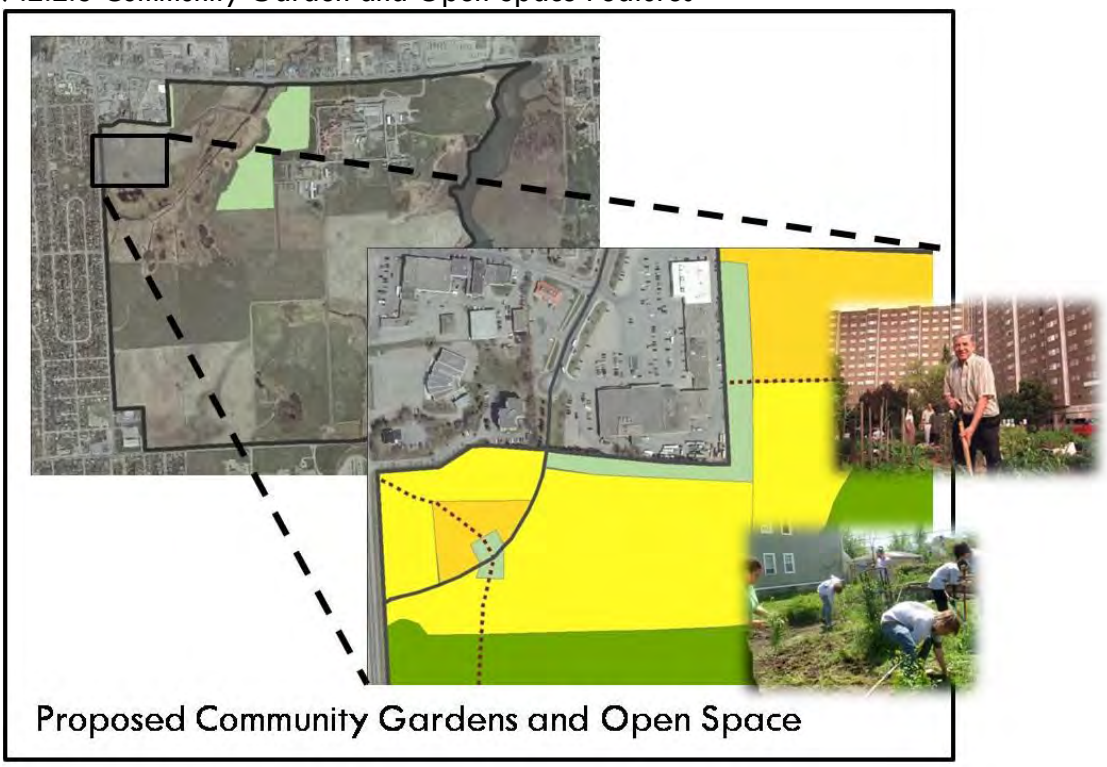
Community Education

Eco-Agriculture protecting biodiversity

Opportunity to plant a variety of produce

Figure 7.4 – Agricultural Features (Note: image sources at end of document)

7.2.2.3 Community Garden and Open Space Features



Effective use of open space

Garden Plots for the Community

Figure 7.5 – Community Garden and Open Space Features (Note: image sources at end of document)

7.2.2.4 Community Facility Features

Agricultural education centre

Kingston West Farmer's Market

Healthy, local food outreach & education

Figure 7.6 – Community Facility Features (Note: image sources at end of document)

7.2.2.5 Protected Area Features

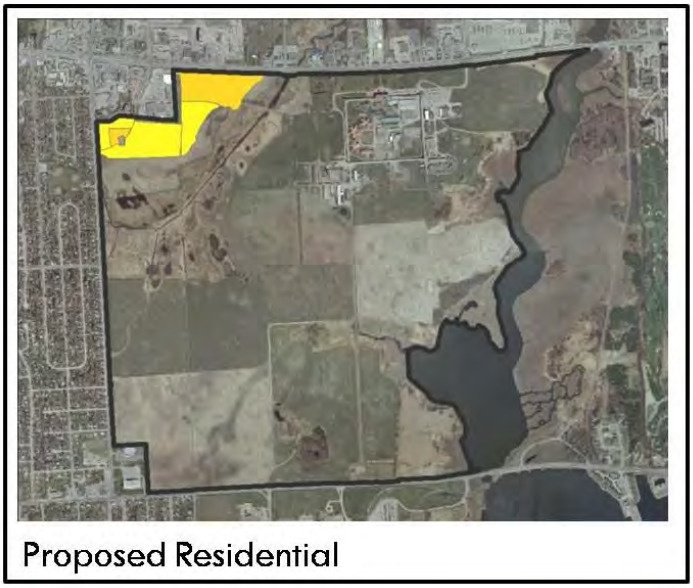
Tree and wetland restoration

Wildlife viewing and education opportunities

Provision of continuous habitat and natural areas

Figure 7.7 – Protected Area Features (Note: image sources at end of document)

7.2.2.6 Residential Features



High Density

Interior Courtyards featuring edible landscaping and community gardens

Mix of incomes, tenure and housing type

Figure 7.8 – Residential Features (Note: image sources at end of document)

7.3 PROPOSED APPROACH

In order to realize this vision of a sustainable community, key features of agriculturally focused development on this site are outlined below, categorized by the following land uses:

1. Agriculture
2. Protected Areas & Open Space
3. Community Facilities
4. Residential
5. Transportation

7.3.1 Agriculture

Organic Farming

The agricultural and peri-agricultural lands use a variety of forms of organic agriculture and husbandry, to avoid health concerns related to the use of pesticides and chemical fertilizers. First time organic certification requires three years to change the soils to required conditions (OMAFRA, date). Learning what forms of organic farming are most appropriate for these lands needs to be explored through further research, along with planning viable transitional uses during the certification process. Organic Farming is often not pursued as it does not produce as high yields and requires more input. In order to minimize the impacts of agriculture on water courses, the use of organic farming methods are suggested.

Diverse & Integrated Uses

Due to the substantial size of the lands, a diversity of uses are possible, thus, a variety of interests can be accommodated. To put into context – the site is the same size of all of downtown Kingston and surrounding environs. A farm operation could exist in conjunction with other uses. Agricultural uses on the site include: dairy farming, start-up farming plots, organic cash cropping, orchards, community garden plots, and experimental farming areas. Compost availability could be made in conjunction with the City's existing food waste recycling projects. Equipment and food storage buildings are shared, emphasizing mixed uses to provide efficient use of the site. Parking of vehicles would be available and the use of existing farm roads would also be permitted. Focusing on enhanced efficiency of uses both temporally and spatially will contribute to the sustainability of the site and surrounding areas.

Eco-Agriculture Research

Agricultural lands are set aside for academic exploration of eco-agriculture techniques, with a particular interest in achieving food yields while enhancing biodiversity (see figure 7.9). Particular applications of eco-agriculture include working with the topography of the site, anticipating wildlife refuge throughout the site and establishing natural windbreaks to ensure crop protection and physical comfort for human usage. These uses create a natural food producing buffer around the west branch of Little

Cataraqui Creek.[23]

What is Eco-agriculture?

"Eco-agriculture" is a term coined in 2000 to convey a vision of communities managing their resources to jointly achieve three broad goals at a landscape scale — what is referred to as the "three pillars" of eco-agriculture:

- Enhance community livelihoods;
- Conserve or enhance biodiversity and ecosystem services; and
- Develop more sustainable and productive agricultural systems.

Source: www.ecoagriculture.org/page.php?id=47

Figure 7.9 – Eco-agriculture text note

Green Houses

Greenhouses provide nursery and year round farming. It is located in the southwest corner, adjacent to existing community facilities, providing year-round access. The number of greenhouses and space required will require ongoing analysis.

Community Gardens

Community gardens provide an urban food source, foster a sense of community, increase partnerships among local agencies, and improve the health and well-being of residents. The gardens are strategically located to provide easier access to the neighbourhoods and businesses in the area. Plot size varies in order to attract a variety of commitments from residents. Banning the use of herbicides and pesticides[24] provides additional protection to the wetland.

Husbandry

Maintaining the dairy farm provides an educational experience for children throughout the city (Girardet, 2004). A recent study interviewed an education professional who stated "some kids don't even realize that milk comes not from the supermarket but from a cow." (Lam, 2007) Ensuring ongoing educational opportunities help enhance this connection. This would be a small-scale practice, as the lands should be focused on produce, requiring fewer inputs to the land and resulting in higher yields.

Access

The site intends to serve both the immediate residential neighbourhoods and Kingston as a whole. Therefore, internal site access is necessary. Provisions for vehicular, bicycle and pedestrian traffic and comfort would be made, whilst ensuring minimal impact on the agricultural and natural areas.

[23] For more on Eco-Agriculture, see: Sara Scherr and Jeffrey McNeely, authors of the Future Harvest-commissioned report Common Ground, Common Future: How Eco-agriculture Can Help Feed the World and Save Wild Biodiversity.

[24] The City of Kingston's By-law regarding the regulation of pesticides in Kingston (BL 2008-28) states that pesticides should not be applied to 'lawns' which in their definition include ornamental shrubs and plants, vegetables, and flowers located on or in immediate proximity to a Lawn. Further consultation with the City in terms of how this ban applies to property without a lawn is needed.

7.3.2 Protected Areas and Open Space

Protected Areas

A large proportion of the site is designated as protected area. The protected lands in the northwest are to be further rehabilitated. Any pathways in these areas require studies to avoid disturbing sensitive wildlife, prevent unnecessary damage to the land and water systems. These studies include an Environmental Impact Statement (resulting in non negative impact) and an Environmental Site Assessment. Protected areas are another dominant focus of this plan due to the opportunity for contribution to continuous habitat preservation and ongoing watercourse restoration efforts within the region.

Trails

An 11.4 kilometre network of walking, skiing, snowshoeing, and biking trails are around the circumference and throughout the property. They would be designed to take advantage of the wetlands as a tourist attraction while maintaining their integrity. The trails are accessible through the residential community, the education and recreation centres, the existing community facilities, and the bus stops and parking areas. They feed into both the protected areas and the agricultural plots. Boardwalks are used in sensitive wetland areas. The trails provide opportunity for educational signage, viewing platforms, sculpture, warming huts, outdoor fitness equipment and privy/restrooms. Offering opportunities for active living and both, passive and active enjoyment of the landscape encompasses some of the ideals of healthy communities.

Open Space

Open space will be integrated with community gardens, residential neighbourhoods and agricultural uses. This will link people with food systems in a recreation context, and foster learning and community spirit (see Figure 7.10).

Open Space and the Farm

Christopher Alexander (1977), an architect renowned for his theories on design declares:

"Parks are dead and artificial. Farms, when treated as private property, rob the people of their natural biological heritage - the land from which they came. In Norway, England, Austria, it is commonly understood that people have a right to picnic in farmland, and walk and play - provided they respect the animals and crops."

Source: www.patternlanguage.com

Figure 7.10 – Open space and the farm text note

7.3.3 Community Facilities

Education Facility

An education centre promotes and educates local ecological, agricultural and historical issues. It also provides the pursuit of further research in these areas. The centre is situated on the northeast section of the property because of the access from Bath Road and the interesting vista of the agricultural lands and wetlands (which could be enhanced by a viewing tower). Recommended

features of the centre include a compost clinic, wildlife garden, insect displays, butterfly gardens, and a venue to introduce educate how other vicinities are approaching similar subjects. The centre would also enhance the tourist-draw of the area.

Recreation Centre

The existing recreation hub (Centre 70 Arena and Royal Kingston Curling Club) in the southwest corner of the site would be modified to increase the multitude of its uses. Additions include a natural playground, barefoot running area, and picnic facilities. All these would take advantage of the gardens and natural character of the lands.

Cannery, Freezing Centre, and Incubator Kitchen

To better utilize and capitalize on the food produced, a cannery, freezing centre, and incubator kitchen (see Figure 7.11) would be provided in a multi-purpose structure. This centre would educate on commercial food standards, and provide a certified way of safely creating value-added agricultural products. Access would be open to all involved with agriculture on the lands, although the equipment and storage facilities may require user fees. This is an excellent opportunity to provide year-round education and application of a localized food system – opportunities exist to use the value-added products to fund some of the associated costs with the concept.

What is an Incubator Kitchen?

A business incubator dedicated to early stage catering, retail and wholesale food businesses. In the case of these lands, the facility would be primarily dedicated to use for the sale of food produced on site. Kitchen incubators can alleviate the significant levels of food safety regulation and capital investment in commercial kitchen equipment. By covering the capital cost of shared kitchen facilities, which are lent on a timeslot basis to incubatees, the kitchen incubator enables a business to develop to the stage where it can invest in its own kitchen facilities.

Source: Agricultural Marketing Resource Centre. www.agmrc.org/markets__industries/food/kitchen_incubators.cfm

Figure 7.11 – Incubator kitchen text note

Farmer's Market

A farmer's market will be located in the south corner of the property near the existing community facilities and the cannery. According to community consultation as part of the review process of the City's Official Plan identified an interest in a West location for the Farmer's Market (Cumming + Company, 2007). As there are no commercial facilities in this area currently, it would provide better access to food for the adjacent neighbourhoods and compliment the current uses. The existing parking lot could be used for the market as well.

7.3.4 Residential

Medium and High Density Housing

Two areas in the northwest corner of the site are recommended for residential use. These areas were chosen based on their poor soil capabilities, in addition to the location's access to existing commercial, residential and transit. Sixty percent would be for medium density and live-work units, and forty percent for high density residential. This would give a total gross site density of 119 dwelling units per hectare. Strategically placing residential uses on the site where they currently exist limits the cumulative impact of human activity in the more sensitive portions of the site.

Affordability

One-third of the units would be used for affordable housing (rental), one-third affordable (owned) and one-third for those with stronger economic means. This mix ensures there is a vibrant and representative community who may all make use of the agricultural and garden resources.

Green Design Techniques

The buildings meet with rigid sustainability guidelines[25]. The parking utilizes bio-retention features and onsite storm water management. There would be access to community gardens, roof top gardens and window boxes, which would transition to the more intensive agriculture uses on site. These lands also have access to the trail system. It is strongly encouraged that materials of lasting quality and value that are local to the area, such as limestone, aluminum, and lumber.

7.3.5 Transportation

Road Extension

An extension of Gardiners Road is planned by the City of Kingston. This permits greater access to the new residential development, and is consistent with Kingston's Official Plan. This road extension exists where there is currently a neighbourhood commercial and transit hub. Residential development is focused around this hub area to make use of existing services and amenities.

Sidewalks and Bike Paths

Adding sidewalks and cycling lanes along Day's Road, Front Road, and the extension of Gardiners Road is a priority. These would need to be designed to be attractive and safe for pedestrians and cyclists. Such addition of facilities is recommended in the City of Kingston's Cycling and Pathways Study (2003).

Bus Stop Shelters

Bus stop shelters are recommended at all current bus stop locations. Bus stops could integrate with viewing platforms to allow those waiting, an opportunity to appreciate the agricultural lands and associated wildlife.

[25] Chapter 5 Case Studies and Chapter 6 The Green Communities Concept for further details on sustainable design features

7.4 IMPLEMENTATION TOOLS

The concept of keeping these lands almost exclusively agricultural would require innovation and creativity combined with vast amounts of energy from the stakeholders and cooperation from multiple levels of government to see such a vision through. Specific tools have been identified, followed with scenarios, which are potential aids to these lands remaining as active agriculture. A unique, context sensitive solution should be derived if this concept were to come to fruition.

7.4.1 Tools

Policy Support

Community-based urban agriculture is supported in all land use designations in the City's Adopted Official Plan (Section 3.2.8). The Provincial Policy Statement, Adopted Official Plan and its associated studies (i.e. Kingston Agriculture Study, 2007) provide emphasis on the protection of agricultural resources, in conjunction with other resources that exist on the site (water, natural heritage and cultural heritage landscapes).

Official Plan Designation

Designating the large tracts of land (predominantly the agricultural land and protected areas) to ensure long-term protection from conventional development.

Secondary Plan

Section 2.4.6 of Kingston's Adopted Official Plan speaks to the order of development which the city will follow. Given the Frontenac Institution Lands are currently classified as a "Special Planning Area" they would be subject to development only after extensive studies (as outlined in Section 2.4.10 of the Adopted Official Plan), community consultation, and a full secondary plan were prepared. Given the public nature of this process, it would be an opportunity for the stakeholders looking to keep these lands as agriculture to influence the planning process and ensure the secondary plan developed so that the agriculture use can continue. This is a medium to provide site-specific policies to implement this or other concept plans.

Easements

An easement is a legal agreement where a landowner transfers specific property rights to a land conservancy, such as the Ontario Farmland Trust or Cataraqui Conservation Authority that would protect the land's agricultural uses and assist in enlarging the buffered areas on the site. This conservancy is a signatory to the agreement and holds the easement. The purpose of land protection agreement is to protect the conservation values and in this case, the agriculture use of the lands in perpetuity.

Development Cost Charges

This option could be explored in the case of the new development to partner the lands with garden or open space uses.

7.4.2 Scenarios

Jurisdictional

There are a number of scenarios in which agricultural use could continue. The federal government, who currently owns the property, could place an easement on the lands limiting the land to agricultural uses. This would involve influencing the federal decision makers to create such an easement. Creative partnerships between provincial and municipal levels of government could also be considered if the land was transferred to their ownership.

Community Supported Agriculture

Community Supported Agriculture (CSA) is where farmers receive a set fee from the consumer prior to the start of the growing season. In return, the consumer receives shares (i.e. produce) of the farm's production but also accepts the risks of a poor production year. For CSA's to be effective there needs to be farmland available close to a population that wants to support local food, in addition to those willing to participate in various stages of its production. These lands could offer an opportunity for this model if trained and committed farmers were available. One study notes that several of the CSAs in the Kingston area have significant waiting lists (Local Food Primer, pg 41). These lands' strategic location in the centre of the city and near major shopping nodes may present an opportunity for a CSA's client list.

Development Supported Agriculture

The case studies[26] further illustrate this model but generally can form a sustainable model of land use that preserves farming culture, agricultural land, and community-based food security. This model sees the development of homesteads on a large parcel of land with the farm acting as an amenity to the homeowners. The residents can take part in farming or an agreement is set up with local farmers to do this. Regardless, the land is protected in perpetuity. For this to work in the Kingston context, the Frontenac Institution Lands would have to become a special policy area and a developer would have to be involved to allow for such a unique subdivision. Although the precedents looked at were private developments, there still is ability for this pursuit to leverage from publically financed developments (Canada Mortgage and Housing Corporation could inform the development by providing models).

Municipal Supported Agriculture

If the city were to acquire these lands, they could make available, at cost effective rates, parcels of land of various sizes, shapes and locations, to interested people. This would foster increased food safety and security. Organizations like "Food Down the Road" could assist in this effort.

Farming Collective

This would be in the form of farmers coming together (for example, Food Down the Road) to pool their labour, capital and equipment and share in the production. This model would operate on farmers leveraging their extensive capital to purchase the Frontenac Institution Lands if they were to become available and would therefore require an intermediary purchaser (assistance could come also from organizations such as Ontario Ministry of Agriculture, Food and Rural Affairs to support start up farms).

[26] See Chapter 5, Section 5.3 Communities and Agriculture

Urban Agriculture

Urban agriculture includes a variety of urban and suburban food growing methods including community gardens, backyard gardens, rooftop gardens, and container gardening. All of these would be viable on the Frontenac Institution Lands given its size. A common deterrent for agricultural practices in such an urban location is presented in machinery access to the site. This concept maintains existing farm roads, however the need would exist for machinery to move on and off site. This is an important issue and perhaps fallacy in implementing such a plan. Smaller scale operations on the site (requiring little or no machinery) may be a more viable option when considering such issues associated with access.

Cuba uses urban gardening to produce about 60 percent of all vegetables consumed in the country (McBay et al, 2007). Although Kingston varies socioeconomically and climatically from Cuba, the premise of efficient use of space and resources is a necessity for livelihood and survival, whilst contributing to sustainability. A study indicated that Kingston could produce as much as 70 percent of fruit and vegetable needs from within the city itself (McBay et al, 2007).

Agricultural Urbanism

Agricultural urbanism is a form of development in which agricultural uses extend from large farms on the outskirts to smaller farms on the village periphery, to community gardens and the window boxes scattered throughout the densest areas of the development. This model looks to address the separation of where we live and where our food comes from (Southlands, 2009).[27] Elements of agriculture and food production should be present throughout the site to enhance the food system.

Farm Incubator Programming

With aspiring farmers facing barriers in gaining access to training, land, and capital (specifically start-up funds and equipment) programs have emerged to respond to facilitate farming as a career choice. Programs such as FarmStart and CRAFT (Collaborative Regional Alliance for Farmer Training in Ontario) are offering opportunities for young farmers to find organic farming internships, and provide access to land and equipment to gain the necessary experience.

Educational

Kingston is fortunate, as it possesses several academic institutions (Queen's Royal Military College and St. Lawrence College) each of which may have interest in the agricultural use of the site for academic research or extracurricular programming. This is an especially well timed opportunity as the City and other vicinities reflect on their sustainability initiatives. Educational and experimental farm sites supported by either the federal government or universities occur throughout the country.[28] The Frontenac Institution Lands present opportunities in this area. Other models operate

[27] This model of development is currently being used in Tsawwassen, British Columbia, see Case Study 5.3.3

[28] See the case study on Ottawa's Experimental Farm (5.3.6) for a government-led research farm, or the UBC Farm case study for an example of a university research farm (5.3.5). Research farms also exist at the University of Guelph and the University of Manitoba

under non-governmental and non-profit organizations.[29]

Corporate Support

Approaching large corporations and institutions within the city to purchase parcels of land as a sustainable public relations gesture to lend support to food production in the city. They also present an opportunity for large-scale procurement of local food to further support production on the lands. The lands are currently used to provide food for both the prison system and various organizations in the City – different partnerships with Kingston's institutions for locally sourced food may develop from the suggested plan. As well emerging groups like the Eastern Lake Ontario Regional Innovation Network which works in the area to support bio-business development could also work to add value to the activities on the site.

'Agricultural Tourism

Agri-tourism is a way to encourage the appreciation of all the different facets of agriculture. From maple season in March, through apple picking season in late fall and into Christmas tree season in December, many farm communities invite visitors to enjoy the scenery and discover an area's agricultural heritage. Additionally, Kingston is strategically located near some of Canada's largest cities and surrounding populations, allowing it to draw upon these populations. Furthermore, given the size of the proposed urban farm (which would be one of the largest in Canada) it could help brand Kingston's sustainability initiative.

[29] See the case study on the Intervale Center (5.3.1)

7.4.3 Financial Tools and Considerations

The economic vitality and feasibility of the concept plan are of key importance. The 14.7 hectares of land recommended for residential purposes is the primary financial driver of the community facilities and amenities. A large-scale organic farming operation could sustain through marketing and selling of the yield produced or through one of the other scenarios previously mentioned, such as corporate sponsors, community supported agriculture or a farmers collective. Figure 7.12 illustrates this scheme.

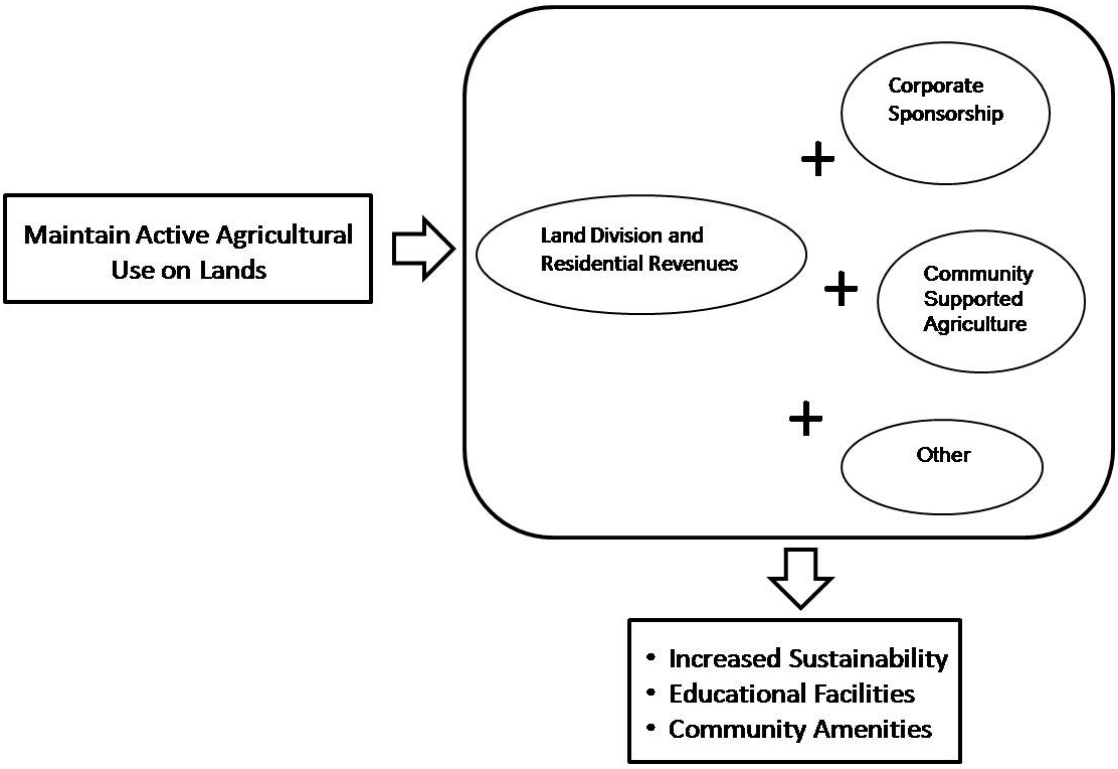


Figure 7.12 – A potential economic process that maintains the Frontenac Institution Lands as agriculture

Any consideration of urban agricultural uses should also use a triple bottom line accounting system that considers the potential for local economic gain, potentially lower long-term health costs, and the positive effects on nearby communities. Although it is difficult to reliably model these benefits, some studies hint at possible benefits. For example, a study in St. Louis, USA, found that rents in the immediate vicinity of gardens increased more than $10 per month, and that these rents stayed relatively constant as other rents fell (Lam, 2007). Additionally, a Queen's University Environmental Studies Master's Thesis has modeled the potential economic, environmental, and social benefits of increasing local food production and consumption in Kingston from the existing 7 percent to higher amounts. Calculations indicated that urban agriculture currently contributes $190 million per year in economic benefits, reduces green gas emissions by 1,300 tonnes based on 39 common fresh fruits and vegetables, and meets the needs of seven to ten percent of the population (Lam, 2007). Table 7.3 outlines the additional benefits of increasing this level of locally sourced food.

Table 7.3 - Potential benefits of increasing urban agriculture in the Kingston CMA. (Adapted from Lam, 2007).

	Percentage of Food that Remains Local (%)			
	Business as Usual			
	7	25	50	100
Estimated Extra Value of Urban and Peri-Urban Agriculture (Million $CND/year)				
Environment	$1.90	$1.90	$1.90	$2
Health	$130	$130	$130	$130
Economic	$54	$180	$370	$730
Total	~$190	~$310	~$500	~$860
Greenhouse Gas Emission Reductions (CO_2 Equivalent Tonnes/year)				
Better Agricultural Practices when Cultivating FFV	370	370	370	370
Reduced Long Distance Imports of 39 Common FFV Products	980	3400	7400	1400
Total	~1300	~3800	~7400	~1400
Food Security and Sovereignty				
# of People whose Minimal FFV Needs can be Met (#/year)	11,000 - 15,000	31,000 - 43,000	60,000 - 83,000	120,000- 160,000
% of Kingston CMA Population	7.2 - 9.7	21 - 28	49 - 54	76 - 110

7.5 NEXT STEPS

This section has described one of many possible visions for the re-development of the Frontenac Institution Lands, which would see the protection of prime agricultural land on the site, while keeping in mind the sensitive nature of the adjacent conservation area and existing surrounding neighbourhoods. The potential of having an exemplary urban farm in a city striving to be one of the most sustainable places on the continent would be a significant step forward in maintaining a healthy food supply and in meeting the sustainability objectives of Kingston residents. The implementation tools and financial perspectives shed light on the viability of putting into action such a vision for the land.

Moving forward from a concept to secondary plan stage, further studies would need to be undertaken, including but not limited to:[30]

- Agricultural Soils Assessment / Impact Analysis on Agricultural Lands or Operations;
- Archaeological Assessment(s) and Impact Mitigation Report;
- Architectural Control Guidelines;
- Biomass Energy Generating System-Related studies;
- Community Services and Facilities Study;
- Compatibility Assessment;
- Concept Plan showing the ultimate use of the site, including access and internal movement;
- Control Plan for lot grading and drainage;
- Decommissioning Plan (dismantling and removal of equipment);
- Design Guidelines;
- Emergency Management Plan;
- Environmental Assessment, particularly for the road extension
- Environmental Impact Statements for residential development and the trail system
- Control plan for lot grading and drainage and stormwater management
- Environmental Implementation Report;

Additionally, critical to this concept's success would be the creation of a volunteer network both on an individual and business/institutional/organizational basis. An inventory of support and associated ability would help provide the momentum this type of plan would need.

[30] See section 9.12.3 (d.) of Kingston's Adopted Official Plan for full list of studies

8.0 Plan Evaluations

This chapter evaluates the two proposed concept plans according to two professionally accepted evaluation tools. In addition, a standard evaluation scheme based on this study's guiding principles compares and contrasts the two concept plans.

8.1 GREEN COMMUNITY CONCEPT EVALUATION

The Green Community Concept Plan will be evaluated using the Leadership in Energy and Environmental Design for Neighborhood Development (LEED-ND) criteria. The Congress for New Urbanism, the US Green Building Council and the Natural Resources Defense Council partnered to develop a framework for sustainability at the neighbourhood and community level. The result of their efforts is LEED-ND, a framework that evaluates communities on criteria related to smart location and linkage to the community at large, neighbourhood pattern and design, green construction and technology, water and energy conservation, and innovation and the design process. LEED-ND is an internationally accepted standard for high performance in green design and construction. (Congress for New Urbanism, 2007)

A true LEED-ND evaluation should be carried out by a LEED-ND Accredited Professional (AP), who possesses training and expertise in all aspects of the checklist. Therefore, the approach being taken in this evaluation is to outline the elements of the checklist the Green Community Concept Plan has incorporated, without attempting to assign rating values for each feature. If the concept plan was to go forward, it is recommended that a LEED-ND AP be consulted for certification. LEED-ND recommends that the certification be used for community units of a maximum size of 130 hectares (Congress of New Urbanism et. al., 2009). Therefore, the Frontenac Institution Lands would ideally need to be split into three separate developments in order to best benefit from the LEED-ND framework. This would likely naturally occur through different phasings.

Table 8.1 – LEED-ND Checklist for Green Community Concept Plan[31, 32]

	Smart Location and Linkage	Comments
✔	Smart location and linkage	Site is located in area surrounded by existing infrastructure
✔	Imperilled species and ecological communities	Species at risk identified and habitat preserved
✔	Wetland and water body conservation	Wetlands protected and restoration promoted
x	Agricultural land conservation	Minimal amounts of agricultural land preserved for agricultural uses
✔	Floodplain avoidance	Development not suggested within flood plains
✔	Preferred locations	Site located within the existing urban fabric
x	Brownfield redevelopment	Not located on a brownfield
✔	Location with reduced automobile dependence	Transit served location
✔	Bicycle network and storage	Extension of bike paths from downtown to site recommended, bike paths and storage encouraged within the site
✔	Proximity of housing and jobs	Site is located near existing commercial and industrial employers, as well as easily accessible to the CBD
x	Steep slope protection	Not applicable to this site
✔	Site design for habitat or wetland and water body conservation	Wetlands protected through CRCA
✔	Restoration of habitat or wetlands and water bodies	Current restoration work on site recommended to continue
✔	Long-term conservation management of habitat or wetlands and water bodies	Development of community environmental monitoring team recommended
	Neighbourhood Pattern and Design	
✔	Walkable streets	Pedestrian activity encouraged through safe and appealing streets and pathways
✔	Compact development	Areas within walking distance of transit are over 30 du/ha
✔	Connected and open community	Street connectivity within the site as well as into the surrounding community encouraged
✔	Mixed-use neighbourhood centres	Diverse land uses located within walking distance of each other and high and medium density residential located adjacent to proposed and existing services and facilities
✔	Mixed-income diverse communities	Inclusion of 25 % affordable housing units on site
✔	Reduced parking footprint	New off-street parking is limited and new facilities are encouraged to share parking space with existing facilities where possible

[31] The American version of the LEED-ND checklist is used as the Canadian version is currently in the development stage (Canadian Green Building Council).
[32] Checklist adapted from LEED 2009 ND Project Scorecard

✔	Street network	Local street network is recommended to connect with roads around the site boundary to increase connectivity with surrounding community
✔	Transit facilities	Installation of transit shelters and bike racks encouraged
x	Transportation demand management	Needs further consideration
x	Access to civic and public spaces	Needs further consideration as part of site design
✔	Access to recreation facilities	Both outdoor and indoor recreational opportunities exist on the site
x	Visitability and universal design	Recommended design feature
✔	Community outreach and involvement	Community liaison and dedicated municipal staff member recommended to engage and inform community before and during development process
✔	Local food production	Community gardens and edible landscaping encouraged
✔	Tree-lined and shaded streets	Streets to be lined with trees
✔	Neighbourhood schools	One school recommended on the site
	Green Infrastructure and Buildings	
✔	Certified green building	Green building technologies recommended for the site
✔	Minimum building energy efficiency	Building energy efficiencies recommended
✔	Minimum building water efficiency	Grey water recycling for use in toilets and landscape watering
✔	Construction activity pollution prevention	Project construction mitigation techniques must be in place
✔	Water-efficient landscaping	Grey water recycling for landscape irrigation
x	Existing building use	No existing buildings located on buildable area
x	Historic resource preservation and adaptive reuse	No existing buildings located on buildable area
✔	Minimized site disturbance in design and construction	48% of site will be left undisturbed
✔	Storm water management	Low Impact Development practices encouraged
✔	Heat island reduction	Green roofs encouraged
✔	Solar orientation	Passive and active solar strategies encouraged
✔	On-site renewable energy sources	Solar energy generation encouraged
x	District heating and cooling	Recommended
✔	Infrastructure energy efficiency	Public infrastructure encouraged to be energy efficient
✔	Wastewater management	Grey water recycling and rain water capture
x	Recycled content in infrastructure	Needs further consideration
✔	Solid waste management infrastructure	Recycling and composting facilities encouraged to be located throughout the site
x	Light pollution reduction	Needs further consideration
	Innovation and Design Process	
	Professionally designated	
	Regional Priority Credit	
	Professionally designated	

The Green Community Concept Plan incorporates many features of a LEED-ND community, as witnessed in Table 8.1. However, a significant portion of LEED-ND features are design based, thus the concept has been evaluated only upon features that are encouraged throughout. Specific site design would play an important role, but would also require community consultation and charrettes in order to ensure these features are implemented in a fashion that is desired by the community. For example, access to public and civic spaces should be integrated into site designs, but are site specific. Other features that were not explicitly discussed within the concept, but are recommended, include a study on transportation demand management in order to ensure alternative modes of transportation are accessible and desirable to residents within and surrounding the site. Another example would be the reduction of light pollution, which could be achieved through specific design features. Additionally, several of the criteria not attained were not applicable to the site, such as preserving vegetation on steep terrain, reusing historic buildings, and being located on a brownfield.

Overall, the Green Community Concept Plan appears to be representative of a sustainable community plan and would be an appropriate option for the Frontenac Institution Lands if the residents of Kingston were interested in incorporating a LEED-ND residential development within their urban boundary.

8.2 AGRICULTURAL CONSERVATION CONCEPT PLAN

The evaluation tool used to evaluate the Agricultural Conservation Concept Plan is that used by the development team for the Southlands Project in Tsawwassen, British Columbia. As can be illustrated in the Southlands' case study analysis, this project has a great deal in common with the Agricultural Conservation Concept Plan put forward. Both plans intend to use the lands for parks and open space, residential mixed-use, and agricultural production. Additionally, each plan integrates the goals of enhanced community engagement, environmentally responsibility, and financially viability. However, there are differences in location and the percentage of land-uses that each emphasize. The Southlands project promotes an equal division of the land for different uses, whereas the Agricultural Conservation Concept Plan prioritizes agriculture. The following table outlines how the Agricultural Conservation Plan compares to the Southlands 8 pillar evaluation framework.

Table 8.2 – Southlands Project Evaluation Checklist used for the Agricultural Conservation Concept Plan[33]

	Land Use	Comment
✔	Protect and enhance natural resources of the site.	Wetlands undisturbed and protected
✔	Provide housing that is integrated with the natural resources of the site.	Use of sustainable building practices and social needs
✔	Create a land-use pattern that balances housing, light commercial, agriculture, protected ecosystems, and community amenities.	Stress is on agriculture with other diverse uses
✔	Where possible provide connection within the site and to surrounding areas.	Community gardens and pathways throughout the site
x	Plan for a density on the site that will support transportation choices, local services and community amenities.	Needs further consideration
	Transportation and Mobility	
x	Design employs a "Mobility Hub" concept.	Could be considered for the NW and SW corners of the site
✔	Design focuses on people rather than automobiles. It will discourage conventional automobiles in favour of walking and cycling.	Limited road infrastructure throughout site, but inclusion of pedestrian and cycling paths
✔	The design will provide opportunities for residents to increase the economic, social and environmental sustainability of their households, their community, and beyond.	Proximity of residents to community gardens
	Housing	
✔	Design new housing to foster the co-existence with the existing surrounding residential development limiting potential activities.	Community facilities accessible throughout the site
x	Design new housing settlement patterns which harmoniously transition between urban edge and rural areas.	Needs further consideration
x	Plan and design sustainable infrastructure to contribute to the overall ecological performance of new development	Needs further consideration
✔	Plan and design settlement patterns in the area to be walkable, respect the human scale and compliment and supplement the community's existing housing supply.	The site promotes a limited access to vehicles. Its major focus is on manual forms of transportation and also works to better facilitate bus use.
✔	Provide residences and activities on the area for people to reside and use at all stages of their lives.	Not explicitly put forward in the plan but it certainly reflects this idea.
	Green Building	
✔	Designing buildings that are healthy, more ecologically integrated, and reduce energy, greenhouse gas emissions and water consumption, while remaining economically viable.	Green building technologies are encouraged on developed areas
✔	Utilize local, sustainable materials in construction where possible.	Stressed notion in the plan.
	Green Space, Wildlife and Recreation	

[33] This is only a general comparison, since the Southlands Tool is context specific. Where ever the term "Southlands" was used, the wording was modified to better fit a general context. The original table can be located in the "Program and Guidelines" chapter in *Design Brief* by Southlands Community Planning Team.

✔	Provide new and protect existing ecosystems and wildlife habitat to support biodiversity and ecological health of the site.	Wetland protection and conservation expanded from current levels
✔	Create a social landscape.	Community gardens and facilities are accessible on site
✔	Provide passive recreation opportunities within natural areas of the site.	Self-propelled recreational opportunities on site
x	Create landscaped areas that are low-input	Needs further consideration
✔	Leverage community financial benefits that might flow from development on the lands to the site to fund the planning and construction of community cultural, social, leisure and recreation facilities that will fill existing and future gaps in such facilities in the community.	Housing development profits will subsidize community facilities
	Energy Water and Waste	
✔	Reduce energy, water and materials demand and waste production.	Eco-agricultural practices and green building technologies encouraged
x	Minimize the consumption of fresh water sources and potable water for agricultural irrigation.	Needs further consideration
✔	Protect water sources from pollution and maintain or enhance water quality.	Eco-agricultural buffer protecting wetlands
✔	Provide a solid waste management system that starts with reducing waste, minimizes negative environmental impacts, and makes better use of resources.	Compost toilets and agricultural composting on site
	Food and Agriculture	
✔	Build community through interaction of people with the land.	Community engagement in agricultural practices and learning along with recreation
✔	Promote small scale sustainable agriculture.	Heavily stressed within concept
✔	Protect the natural habitat for birds and wildlife.	Wetland protection
✔	Create aesthetically pleasing viewscapes.	Wetland protection and pastoral scenes
✔	Provide educational opportunities relating to sustainable food production.	Educational facility for community learning
	Education	
✔	Infrastructure to support local lifelong learning opportunities and world-class research related to those issues inherent in the natural built environment.	Educational facility
✔	An environment that fosters interaction among people on the site for a diversity of purposes.	Recreation, agriculture and business opportunities located on site
✔	Economic, social, and environmental sustainability.	Present throughout concept
	Economic and Commercial Opportunities	
x	Create a food and agricultural precinct as a basis for economic activity.	Needs further consideration
x	Create a commercial high-street that serves neighbourhood needs and supports urban agriculture.	Needs further consideration
✔	Provide local job infrastructure.	Farmers market and small business support
✔	Maximize spin-off and supporting economic development.	Agri-eco-tourism

The Agricultural Conservation Plan implements many of the features encouraged with Southlands Project's eight-pillar evaluation framework. The integration of housing and agriculture in the Southlands project is a major divergence between the two plans. The Agricultural Conservation plan includes green housing, however, it is distinct from the agricultural focus of the concept. When evaluated against this framework, the Agricultural Conservation Plan is particularly strong in its green space, wildlife and recreation, energy water and waste, education and food and agriculture.

8.3 GUIDING PRINCIPLES CONCEPT PLAN EVALUATIONS

In Section 1, Kingston's four pillar approach to sustainability is described, which led to the development of a series of guiding principles. The guiding principles were developed in order to ensure that the study's concept plans align with the vision of the City of Kingston to be the most sustainable city in Canada. The first two evaluation tools were used to evaluate how the concepts aligned with professional evaluation standards. This third exercise examines how each concept reflects the guiding principles developed at the start of the study and fit within our intellectual framework.

The Green Community and Agricultural Conservation Concepts each took a different approach to addressing Kingston's vision of a sustainable city. These different approaches were reflected in the significantly different land use patterns within each concept plan. The Green Community's goal was to locate Kingston's forecasted population growth within the existing urban fabric to take advantage of current infrastructure and reduce travel distances. By contrast, the Agricultural Conservation's goal focused on local food security and promoted opportunities for communities to gain a greater understanding of, and involvement with, sustainable food production. Nevertheless, each concept incorporated elements that adhered to the guiding principles set out at the start of the project. The incorporation of these principles is described in Table 8.3.

Table 8.3 – Guiding Principles Evaluation of Both Concept Plans

	Green Community Concept	**Agriculture Conservation Concept**
Ecological		
Preserve and enhance the local ecosystems	Both concepts protect and restore wetland areas	Both concepts protect and restore wetland areas
Ensure integration of land uses with existing natural features	Respect the natural topography of the site and alternative storm water management	Uses organic farming methods and eco-agriculture to buffer wetland
Ensure energy and water efficiency, reduced CO_2 emissions and promote stewardship of local	Alternative storm water management, intensification, green building technologies, alternative transportation	Reduced Nitrogen, eco-agricultural buffer

resources		
Promote and facilitate the use of alternative forms of transportation	Bike and pedestrian focused design with transit expansion	Pedestrian and bike trails
Social		
Create complete, mixed use land use design that is consistent with the needs of the Kingston area	Complete green community	Mix of agricultural types with community uses
Ensure the availability of a variety of housing choices	Diverse housing types and range affordability	Smaller residential site with mixed housing types
Promote healthy lifestyle choices through responsible design	Both concepts integrate alternative transportation, local food and recreational opportunities	Both concepts integrate alternative transportation, local food and recreational opportunities
Ensure connectivity with surrounding community	Street and trail network connections, community uses	Trail networks and community uses
Promote community partnerships	Both concepts have strong focus on community collaboration	Both concepts have strong focus on community collaboration
Economic		
Provide opportunities for sharing resources	Both concepts focus on sharing protected areas and local agricultural opportunities	Both concepts focus on sharing protected areas and local agricultural opportunities
Financial feasibility of the plan	Both involve significant investment	Both involve significant investment
Entice visitors from outside the immediate community	Both have agricultural and community facilities for the greater community and tourism	Both have agricultural and community facilities for the greater community and tourism
Contribute to Kingston's economic development and growth	Construction employment during development phasing	Indirect benefits of local start-up business growth and agriculture industry
Cultural		
Acknowledge and integrate the history and heritage of the site	Educational programming around history of site uses	Extensive continued agricultural uses and educational programming
Respect sense of place	Both plans protect and enhance the surrounding wetlands and are community focused	Both plans protect and enhance the surrounding wetlands and are community focused
Provide opportunities for growing and promoting local, sustainable sources of food	Both integrate local food cultivation opportunities	Both integrate local food cultivation opportunities
Ensure opportunities for	Public art and agriculture	Public art and agriculture

creative expression

Evidently, that there are several common elements. While the proportion of the site dedicated to agriculture is different, both concepts illustrate a common desire to continue local food production on the site with an element of community participation and learning associated with these farming activities. Similarly, both plans saw the potential for some form of residential development that takes advantage of the site's well-serviced locaiton. There is also a strong component of ecosystem preservation within both concepts, and wetland conservation and restoration feature strongly. Community building is also encouraged through various means, both in the initial design for the site, and through mechanisms that ensure engagement continues in perpetuity.

Looking at all three exercises as a whole affirms that the concepts work in harmony with the site to advance principles of sustainability. Though both projects differ widely as to how the land is used they share a great many similarities. The follow chapter provides recommendations based on the shared themes in the concept plans.

9.0 Recommendations and Conclusions

The Frontenac Institution Lands have the potential to support the sustainability goals of Kingston's Official Plan. This report presents two different concept plans. One focuses on green development that could accommodate Kingston's projected population growth while the other presents options for adapting the existing agricultural uses. However, the size and scale of the lands allows for many different approaches, and achieving sustainability is not limited to the two concept plans presented.

Instead, it may be best to consider the concepts as options that demonstrate certain site uses and open a dialogue for discussion on the many ways that sustainability could be pursued. They provide a starting point to consider how different features could be incorporated on the site, and to reflect on how different land uses may work together. In this respect, although they differ in approach, the concept plans provide insight into alternate ways to achieve similar goals. The following recommendations are based on the strengths that emerged from the plans and on stakeholder support, while the conclusion discusses ways to reach these ideas and the next steps that are required to continue dialogue on the site.

9.1. RECOMMENDATIONS

During our initial brainstorming stakeholder workshop, two perspectives on sustainability emerged, one that valued urban intensification and another that valued urban agriculture. Urban intensification was supported as a way to condense Kingston's population growth closer to the downtown and prevent its spread into the farmland and natural areas to the east and west. However, there were concerns about building over prime agricultural lands, the impact that intensification would have on the nearby wetland, and the irreversibility of converting the site to residential development. Alternatively, urban agriculture was supported as a way to integrate Kingston's food needs and food systems with the city, and to foster and preserve a unique cultural landscape. However, there were also concerns about the financial viability of agricultural uses and the potential conflicts when farming in an urban area.

Generally, feedback was positive on both plans at our second stakeholder workshop. All stakeholders appreciated the incorporation of protected areas on the site, and the recognition and integration of surrounding land uses. Any future plan should also take these into account. There was also discussion around the intensification of the land compared to agricultural uses, with similar ideas to the first workshop. Most stakeholders

appreciated the idea of intensification, particularly if it could prevent expansion into Kingston's eastern growth areas. However, the irreversibility of an intensified land use was noted, and the reversibility of an agricultural approach was valued. Discussion also arose over preserving the area by minimizing human intrusions compared to capitalizing on the site's location by promoting visitors.

The following recommendations try to take the strengths of the concepts plans and use them to mitigate their individual weaknesses. Ultimately, given the size of the site, and the Provincial Policy Statement's and Kingston Official Plan's support for both ideas, it seems possible to maintain a significant amount of agriculture while still housing a large portion of Kingston's expected growth. This would reduce the spread of Kingston's predicted population growth, increase the financial viability of agriculture uses, and help preserve a heritage landscape. However, a combined plan would still need to address the potential conflict between agricultural and urban needs, and the impact of intensification on the wetland. Where possible, our recommendations suggest methods to ease these concerns.

9.1.1 Natural Area Protection

Protect Floodplain & Wetland

Both plans valued protecting the wetland. Although this is supported in policy, preserving the ecological functioning of the wetland has many other benefits socially, economically, and environmentally. It was also received positively by all stakeholders, and is an important aspect of reducing the impacts of urban intensification and increased site use on the site's natural features.

Buffer Protected Areas

Creating buffers can further wetland protection, while allowing for alternate uses. The width and type of buffer depends on the other uses of the site, and the impacts that they may have. The existing agricultural site uses, and the importance of the site's prime agricultural land, both suggest that an agricultural buffer could be appropriate. This could range from small-scale community gardens to full farming operations.

Restore & Enhance

Restoring parts of the wetland, and enhancing the protected area by connecting the two sides, was a popular workshop idea. Stakeholders noted the habitat value of creating a natural corridor between the wetlands, by connecting the east and west sides. The idea of restoration work was also positively received, and could help mitigate any loss in habitat caused by other site uses.

9.1.2 Urban Intensification

Medium & High Densities

The site's situation to downtown Kingston makes it well suited to accommodate higher density residential developments. The northwest corner of the site, which has a lower class of agricultural land[34] and is adjacent to a shopping centre and existing transportation routes, is particularly well-suited. This location reduces the need for new roads on the site and benefits the existing commercial area. A mix of high and medium densities on only 50 hectares could accommodate almost 40 percent of Kingston's projected housing needs, including all of its apartment needs and half of its attached dwelling needs.[35] This would prevent growth in east Kingston, and profits from the development could help support other site uses.

Green Building Design

Any residential development should incorporate green technologies, such as passive solar orientation, local or re-used building materials, energy efficient appliances, and on-site power generation to reduce carbon emissions and demands on the city's power generation. Stakeholders suggested linking these features with Kingston's new Sustainability Centre.

Stormwater Management

Stormwater management should also be an important part of the site design to reduce the impacts of intensification on the wetland and city infrastructure. Techniques to reduce runoff include using pavers rather than asphalt, creating rain gardens and swales, and promoting green roofs. Constructed wetlands to manage runoff and a grey water recycling system would further mitigate the impact of storms and reduce demands on existing infrastructure.

9.1.3 Urban Agriculture

Eco-Agriculture

The majority of the site includes prime agricultural land, which could provide an important urban food source for Kingston. Eco-agriculture is an integrated approach to farming that promotes community livelihoods, environmental services, and agricultural productivity. This approach is recommended because it allows for a variety of uses and also recognizes the importance of protecting the wetland. However, within this approach, stakeholders noted the importance of creating a well-functioning and feasible farm operation, and felt that this should be the top priority. A farm plan could be developed to help ensure that the most compatible

[34] This soil classification was criticised by a member of the agricultural community who suggested that the inventory should be updated, and that the actual classification could be much higher. See Appendix 1 and 2 for a discussion for this critique.

[35] Based on 10 hectares of land devoted to high density apartment housing (200 du/ha) and 40 hectares to medium density housing (80 du/ha. Total residential land (50 ha) is less than half that presented in the Green Communities Concept plan.

agricultural uses are pursued.[36]

Community Involvement

Urban agriculture offers an opportunity for greater involvement with the food production system. Community gardens could help foster a sense of community in the new residential development and link it with the surrounding residential neighbourhoods; they would also improve the health and well-being of gardeners throughout the city. The yield from these lands could continue to support community food banks and the overall social sustainability of the city. Constructing a cannery, freezing centre and incubator kitchen would provide for further involvement with the food production system, and facilitate value-added farm food products. Locating these buildings in the southwest corner would promote their use by the existing residential communities, and take advantage of existing transportation routes and recreational infrastructure.

Cultural Heritage

Maintaining the land as agriculture continues its current and historic use, and reflects the agricultural heritage of the city. It also offers a unique opportunity for Kingston to create a large urban farm that could attract both residents and visitors to learn more about our food systems. An education centre focusing on agricultural and food systems education would enhance this use, and benefit Kingston tourism as a whole. It would also compliment the existing wetland education at the Little Cataraqui Conservation Area, and provide a venue to demonstrate innovative farming techniques.

9.1.4 Community Connections

Integration

Any land uses should strive to be integrated with the surrounding community. This can be achieved through road and pathway design, consideration of surrounding uses and needs, and through community partnerships. Trail linkages and facilities that benefit the existing communities were all positively received by stakeholders, and would help create support for the changes from the adjacent neighbourhoods.

Recreation

The size of the site, and its scenic situation, could provide the foundation for an extensive trail system. This would connect the site internally, and externally to the surrounding neighbourhoods, Rideau Trail, and Kingston Waterfront trail. However, there are concerns over the impact of the trail system on the wetland. If a trail system is pursued, it could be kept along the site's perimeter and outside of the protected area. Recreational uses could be further facilitated through the creation of a recreation centre that could promote seasonal forms of recreation, such as cross-country skiing or snowshoeing.

[36] Community Supported Agriculture (CSA) was suggested as a potential technique to financially support farming operations.

9.2 CONCLUSION

9.2.1 Next Steps

This report is a first step to initiating a dialogue surrounding the Frontenac Institution Lands. The possibility of a change in ownership to the site allows for the exploration of the opportunities the site presents. It is important that this discussion starts early, to provide time to explore a range of options, and to advocate for the type of landowner change that would best suit the site.

If the lands do become available, it will be crucial to engage not just stakeholders, but also the surrounding community. A local steering committee, or liaison group, could be established to provide feedback on how the site proposals could integrate with existing uses. Transparency and community involvement should be a top priority. As many of our case studies indicated, community involvement was central in achieving their successes.[37]

Further clarity on policy and land use regulations, particularly for the agricultural uses of the site, may be needed. A special policy area could address the unique nature of the Frontenac Institution Lands, and also create a framework that prioritizes sustainability and allows for innovation.

Partnerships will also be instrumental in furthering the preferred uses for this site. For example, Kingston's Sustainability Centre could help bring green design to a potential residential development, while the Eastern Ontario Innovation Network and Food Down the Road could help promote agricultural uses. Ducks Unlimited, and other conservation organizations, could help with the restoration work and monitoring of the protected areas.[38]

Finally, if any alternate land uses were to be implemented, a range of studies would be required. These are outlined in our concept plans. Some of them, for example, an environmental monitoring program, should be created as early as possible to ensure that they have time to fairly assess the site.

[37] For example, Victoria's Dockside Green had a community liaison group that suggested the area's service needs, St. John's Sideroad used a Context Sensitive Solution approach to build community support, and the Southlands ran lengthy design charettes to allocate site land uses.

[38] These groups were specifically suggested for partnerships at the stakeholder workshop as potentially interested parties.

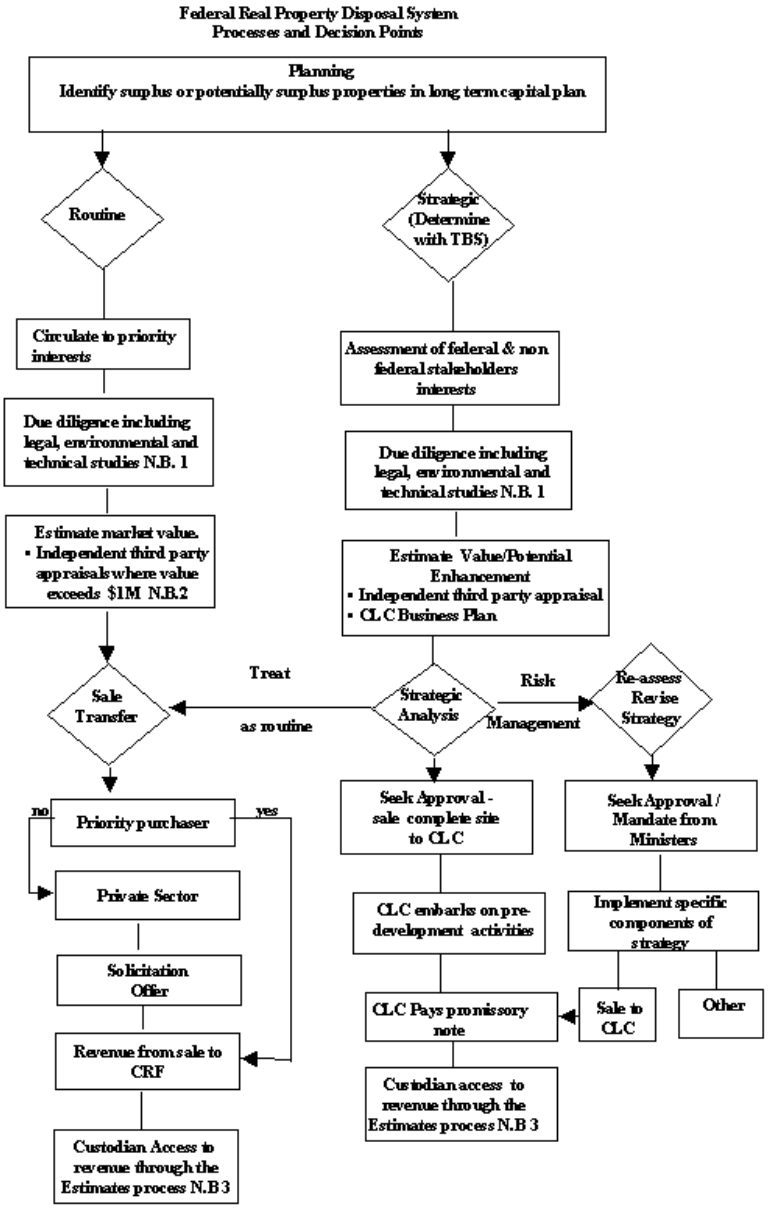
9.2.2 Final Thoughts

As a project course, the Frontenac Institution Lands presented an interesting forum to consider what environmental planning is, what constitutes sustainability, and how sustainable land uses can be achieved. Much of the broader discussion of the value of urban intensification and the value of urban agriculture also arose in our group, and presented a complex problem over alternate environmental, and policy-supported, options. Creating two concept plans allowed us to explore both approaches by examining some of the best-practice environmental planning that is occurring in Ontario, Canada, and the world.

We hope that this report will help continue this dialogue in the broader community, and create a discussion that results in a best-practice, sustainable, and adaptive site plan.

10.0 Appendices

10.1 FEDERAL LAND DIVESTMENT



NB. 1 The custodian must obtain a clear indication of any significant legal issues regarding title, from Justice Canada, prior to proceeding further.

NB. 2 See Open and Fair Transactions Policy Appendix C – Appraisals and estimates.

NB. 3 Custodian access to revenue through ARLU linked to TB approved strategic investment framework.

Source: Treasury Board of Canada, http://www.tbs-sct.gc.ca/pol/doc-eng.aspx?id=12042&section=text#cha1

10.2 WORKSHOP FEEDBACK SUMMARY

This appendix is not intended as a verbatim account of the proceedings of the stakeholder workshop held on October 21, 2009. It is provided here as a record of input. The purpose of this workshop was to present our preliminary research and to elicit comments and perspectives on the Frontenac Institution Lands. Input from relevant stakeholder organizations was important to this process, and was necessary to ensure that our final recommendations reflect, as accurately as possible, the views of relevant stakeholders. Workshop participants were selected to reflect a cross-section of stakeholder organizations from the community, within limited time and space constraints. Stakeholders with interests in the land for economic, environmental, agricultural and community reasons were invited to participate. There were 11 participants, in addition to the group.

The workshop consisted of a brief presentation of the course and site overview, followed by two workshop activities. The first included eliciting comments on pros and cons of three international environmental case study groupings; Communities and Infrastructure, Communities and Green Design, and Communities and Agriculture. Participants were broken up into three groups where they had the opportunity to examine posters outlining international environmental scan of urban sustainability development. They were asked to identify elements they believed for feasible or not feasible for the Frontenac Institution Lands. Some comments are highlighted in section 10.3.

The second activity broke the participants up into two groups, where two large maps of the site were provided, along with tools to mark up the maps with their ideal site uses. This design charette was aimed to stimulate discussion and get feedback on the major components stakeholders would like to see on the site. The goal was to build on the two maps presented for the two development options. Finally, there was a brief wrap up and opportunity for final comments. Comment forms were also available for participants to outline their views and provide feedback on the workshop. The following summary includes the workshop discussion and written comments received.

One of the key outcomes of the workshop was the understanding that there are two distinct interpretations of sustainability among the stakeholders. One approach involved growing food within close reach of urban areas to ensure food security for Kingston. This view argues that prime agricultural land should never be developed as it is nearly impossible to bring it back once paved over. The second view of sustainability was that intensification in urban areas and efficient use of existing land, infrastructure and services are important for building sustainable cities.

Below is a list of key questions that we hoped to answer out of the sessions.

What should the land be used for?

- How much agriculture?
- How much community development?
- How much natural area?

What is a sustainable farm?

- Would organic farming work?
- How small an acreage is too small? Is 10 acres a cut-off?
- How critical is this site to Kingston's food security?

What are feasible site alternatives?

- Can green technologies work here – do we have the suppliers?

- Is there a need for a permanent farmer's market?
- Is there institutional or academic interest in the site?

What would **your** ideal site use be?

Case Study Precedents Discussion: Infrastructure	
Pros/ Feasible	Cons/ Not Feasible
- An educational component is essential to understanding any innovation onsite - Ideal site for pathways, because it's not too close to the wetland. Would need a study to determine impact - Potential for some habitat restoration - Native plan landscaping - Community gardens	- Road Construction and examples not relevant to the site - No road through wetland is feasible. People have to be kept out of the wetland. - Major animal habitat concerns - Sensitive plant animal species
- Eco-passages would help with wetland sensitivity - Visitors centre - Recreation potential, particularly near the curling rink. Could be extended into a recreation hub for the community - Farmer's market – paired with demonstration farming on the land, people see where the food comes from - Close to St. Lawrence college, could be tied to demonstration station of green technology or agriculture	- Current zoning makes it impossible to put a road through. Henderson leads straight into a wetland.
- Farmers market needs to have a demand study to see if it would work – need to see if the business demand is there - Model of what urban farming can be - Rehabilitation research at prison farm could become model, with social programming - Better the soil, better for organic farming, all soil on site should be considered class 1 soil - College having green technology program for prisoner training - Biodigester for animal waste - Wind farm	- Need to have development in the core of Kingston, not an interpretive centre - If nothing is broken, why try to 'fix' it - Strong desire for it to remain a farm, other options should be secondary - Security in the way of developing a business model for the prison farm

Case Study Precedents: Communities and Green Design	
Pros/ Feasible	Cons/ Not Feasible
- Good to keep the water and wetland in mind - Class 4 land - Transit node - Traffic flow should be kept in mind - Pervious pavement	
- Environmental subdivision - Opportunity on bridge for storm water run off - Opportunity for naturalization through surface storm water and natural channels - Walking trails and cycling - Solar panels - Role of developer's in building a sustainable community - Hubs to link with existing transit	- Ontario building code may limit innovation - Narrow roads impossible due to snow storage. Infrastructure must fit with minimum 20 meters - Pervious pavement not feasible - Climate presents challenges with salt and snow - Cost - Swales make it difficult to move
- Community partnerships on a small scale - Solar farm north of 401 - Alternative energy in larger partnerships - Solar roof panels - Use new development standards (since it's a small area) - Opportunity to be a leader - Interest within the community to do something different - Principles for if you want to do a green development and prove where it worked	- Geothermal is expensive - Wind created issues on Wolfe Island - Climate presents challenges - City standards - Nobody wants to be a guinea pig

Case Study Precedents: Communities and Agriculture	
Pros/ Feasible	Cons/ Not Feasible
- Community gardens - Trails (with respect to wetlands) - Reforestry was encouraged to a greater extent	- Livestock would not be permissible under the city's mandates - Split manure is always difficult to deal with (referring to the cattle) - Presence of chickens would lead to a foul odour
- The UBC farm was highly thought of leading to the suggestion of Queen's doing something similar - More forested areas were promoted - Biomass for energy concept	- Cold weather could make this area unappealing for farming - Lifestyle issues: the communities put forward were not though to blend in with a Kingston mentality

- Tie into Queen's campus food requirements	
- Bringing food production and people into common links - Community gardens were favoured - Houses on the area would be good - Organic farming with educational facilities to help teach locals how to grow organically	- There is a fear that developers would take over the lands and ruin the natural heritage and ideal uses

Design Charette

The first group proposed a residential intensification strategy on the site. They suggested that Centennial Drive go through the site as outlined in the Kingston OP. They proposed low density in the southwest corner with the east side of centennial remaining natural areas and protected. The northwest corner was proposed as high density residential. The north central area could incorporate green industry, such as a relocation of the recycling station. They proposed that the current prison operation be moved and the buildings could become a visitor's centre for tourism in order to educate and explain the unique features of the site.

The second group took a much different approach to the site, proposing it to remain as farmland and used as a model demonstration farm. Like the previous group, they suggested the northwest corner as ideal for high density residential and the extension of Gardiner's road. That area could then become a transit hub. The curling rink area could be added to in order to create a recreational hub. A biodigestor was recommended on site to process animal waste from cattle farming operations. A wind turbine was suggested for the southwestern region of the site to generate green energy for site operations. An opportunity for business development across from DuPont was discussed, because it was felt that housing would be deterred by the smell and pollution from the plant. A further mix of business park and high density residential was suggested at the northern edge of the site.

Frequently Noted Comments Raised

- Centennial road extension would be disastrous to the wetland
- Prison farm is essential to local food security and future of Kingston
- Wetlands provide opportunities for environmental restoration, buffers, and educational opportunities
- Security issues from penitentiary
- Using this land for dense development prevents sprawl
- Role of developers and their bottom line presents challenges to innovation and sustainable ideas

10.3 WORKSHOP I (SEPT '09) - IMAGES

All workshop photos sourced from Authors' Collection

10.4 WORKSHOP FEEDBACK SUMMARY

This appendix is not intended as a verbatim account of the proceedings of the stakeholder workshop and presentation held on December 9, 2009. It is provided here as a record of some of the input. A small cross-section of interested stakeholders from agricultural, environmental, and development interest groups were in attendance. In total there were 4 participants, in addition to employees of the Cataraqui Region Conservation Authority, Queen's University faculty and the students from the study group. It was held at the Little Cataraqui Creek Outdoor Centre in Kingston.

The purpose of the workshop was to present the findings from our report and recommendations, as well as facilitate feedback from the group on the two options we developed. This was to ensure that the final recommendations reflect, as accurately as possible, the views of stakeholder organizations from the community.

The workshop consisted of a presentation, followed by a question and answer period, an opportunity to look at the project posters and a break out session. The presentation included an introduction to the project, overview of the site and existing conditions, discussion of precedent case studies, followed by an explanation of the two concept plans, the relevant policy analysis and implementation tools.

The break out session broke the group into two, whereby each had the opportunity to discuss the aspects of each concept plan they particularly liked or did not like with stickers to represent their ideas. This was followed by a discussion on how the aspects they particularly liked could be implemented in the context of the City of Kingston.

One of the major themes of the workshop was sustainability, as this question was a driving force in our study. Participants emphasized that sustainable development has no negative impact on our grandchildren, and that it prioritizes the long-term goals over short-term priorities. Another comment was that sustainability should consider the environmental, social and cultural benefits in addition to economic concerns.

In the question and answer period, participants appreciated the importance of having more than one option for the lands. One participant noted the different options could be phased over time. Once you have residential development, it would be difficult to go back to agriculture uses. However, the lands could be used for agricultural concept plan for a time and then transition to residential uses if need be.

Agricultural Conservation Concept Plan Discussion	
Like/ Feasible	Dislike/ Not Feasible
- The amount of protected areas - Residential in northwest corner is an efficient use - Community gardens in residential area, but they would need to be very productive - Wetland buffer is good - There is a need to overall enhance health of the wetlands - Take advantage of existing commercial - The issue of peak oil and focus on food production in plan - Farmer's market needed in west end	- Need a corridor between the protected areas - Eco-agriculture is hard to get efficiencies in production - Dairy: shared agriculture is the best use of the land - Small agricultural land could be farmed in north east corner - No residential should be put on the lands at all - The Canadian Land Inventory is a poor soil classification system, should be updated - Trail system needs to be outside of buffer - Balancing agriculture designation and intensification is imported to avoiding a Greenfield - Eco-agriculture is trying to be too much for too many people – focus on what works best - Information centre might better on days road
- High density residential in northwest - Good protection of wetlands - Food education centre and cannery and kitchen is a great use	- The protected areas may be over trailed - Need to twin with the community garden and facilities in southwest - Need corridor connection between two greenspaces

Green Community Concept Plan Discussion	
Like/ Feasible	Dislike/ Not Feasible
- High density in northwest - Routing road away from wetland - Protected areas are important - Eco passages and rain gardens - Principles of a green community are good, in terms of renewable energy and passive solar orientation	- Centennial drive may only create a bottleneck at Portsmouth - Henderson through floodplain - Trails – perhaps too many – some wetlands should be left alone - Strip pattern of gardens perhaps would be better in full size, larger

- Location of recreation centre, serves existing communities as well as new communities - Wetland education - Community gardens as transition	plots - Natural Corridor between two wetland areas should be protected
- Gardens would be aesthetically pleasing, among other things - Trails are a great feature for new communities - Cycling - Community Garden buffer - Residential along Front Road - Trail connection to other systems - There's concern over expansion to the east of the city, it would be great if the new community could house enough so third crossing of river could be prevented - Nodes being built are good idea	- Skeptical of need for education centre, perhaps there's an overlap with the CRCA - Declining enrollments in schools – means same number of classes, but fewer students and money – has posed challenges for existing environmental education programming - Recreation centre - Gazebo at Lemoine Point (kiosk) could be a better alternative to an education centre, because its low maintenance - Trails through protected areas - Should be an ecological connection between two wetlands - Larger patches of gardens would be good

Agricultural Conservation Plan Implementation Discussion

- To realize agricultural urbanism, you would need various level of government partnerships, including CMHC
- A model needs to be developed, and perhaps implemented at a smaller scale first
- Federal ownership is a key asset, as conditions could be placed on the lands. Innovation may be possible, due to the fact it is government owned land (eg: Dockside Green)
- Public-private-partnerships are problematic in Kingston
- The high density residential development could help fund elements of the rest of the site
- The CRCA is key to protecting greenspace
- A farm plan management approach would be needed to optimize buffer
- Need to convey that Kingston's identity is linked to the lands (eg: Central Experimental Farm in Ottawa)
- Build a network and identify the multiple types of partnerships surrounding land ownership
- Many organization may be interested in supporting a new approach to agriculture (eg: OMAFRA, East lake Ontario regional innovation network, and Food down the road)

Green Community Concept Plan Implementation Discussion

- The CRCA needs money and long term acquisition of the lands, particularly the west branch
- Ducks unlimited could play a key role through wetland restoration, protection, education
    - Past work has included fencing to keep cows away, equipment for tillage, Ducks has invested perhaps $70, 000 into restoration
- Kingston Wetlands Working Group is an important player
- Dupont could further partner in protecting the wetlands
- Programming could be a challenge in the education centre, would need money and partnerships
- Affordability
- Twinning uses is essential for minimizing parking space requirements
- Development charges to sustain facilities
- Development industry – LEED type house are a premium – there is interest, its coming, but it needs a kickstart
- Government Grants would help the development industry kick start LEED type residential development
- Electricity from Wolfe Island goes right through the land – good energy infrastructure there
- Sustainability centre in Kingston
- Connecting community gardens throughout Kingston – they are under threat
- Treaty with local aboriginal land claims

WORKSHOP II (DEC '09) - IMAGES

All workshop photos sourced from Authors' Collection

11.0 Works Cited

Anderton et. al. 1996. *Collins Bay Penitentiary Farm: Planning Recommendations for Redevelopment of the Collins Bay Penitentiary Farm.* Kingston, ON: School of Urban and Regional Planning.

Buchanan, D. 2007. "Under the Boardwalk – Case History – St. John's Sideroad at the McKenzie Wetland, Aurora, Ontario, Canada."

Caldwell, Wayne, Temple, Katie. *Canada's Capital Greenbelt: Moving Towards Sustainable Agriculture.* Farm Research Project School of Environmental Design and Rural Development University of Guelph July, 2009 Prepared for the National Capital Commission

Canadian Green Building Council. *LEED Canada for Neighbourhood Development (ND)* <http://www.cagbc.org/database/rte/nd%20outline%20092209.pdf>.

Canada Mortgage and Housing Corporation. 2008. *Housing Now, Kingston CMA: Fourth Quarter 2008.*

Cataraqui Region Conservation Authority. 2002. *About Us: Vision Statement.* http://www.cataraquiregion.on.ca/about/stratplan_vision.htm

CECC, Centre of Expertise on culture and communities (2006) Vancouver: Simon Fraser University. http://www.cultureandcommunities.ca/downloads/Salons/Salon3-handout.pdf

City of Kingston. 2007. Ready to Do Better: Report of the Mayor's Task Force on Poverty.

City of Kingston. 2003. Cycling and Pathways Study.

City of Kingston. 2009. *Kinston Integrated Community Sustainability Plan.*

City of Kingston. 2009. *Kingston Official Plan.*

City of Kingston. 2004. *Kingston Master Transportation Plan.* Dillon Consultants.

City of Kingston. 2007. Kingston (Norman Rogers) Airport Master Plan. MMM Group.

City of Kingston. 2009. Draft Official Plan, Schedule 2, City Structure.

City of Kingston. 2009. "Official Plan Newsletter: January 2009." City of Kingston Newsletter No. 2. [October 6, 2009].

City of Kingston. 2009. Kingston Transit, My Ride. <http://www.cityofkingston.ca/residents/transportation/transit/schedules/index.asp>.

City of Kingston. 2004. "Urban Growth Strategy." *J.L. Richards & Associates Limited.* Kingston: Ontario.

City of Kingston Planning and Development Department. 2009. "Census 2006 Neighbourhood Profiles and Neighbourhood Map." City of Kingston Website. [October 6, 2009].

Clark Consulting Services. (2007). "Agricultural Study – City of Kingston."

Clark Consulting Services (2005). "COIL Development Strategy, Prepared for the City of Kingston".

Collins Bay Penitentiary Farm. 1996. Collins Bay Penitentiary Farm: Planning Recommendations for Redevelopment of the Collins Bay Penitentiary Farm. Land Use Project Course School Of Urban and Regional Planning.

Congress for the New Urbanism et al. (2009). *LEED 2009 for Neighbourhood Development Rating System*. US Green Building Council. <http://www.usgbc.org/DisplayPage.aspx?CMSPageID=148>.

Congress for New Urbanism. (2007). LEED *for Neighbourhood Development (LEED-ND)*. <http://www.cnu.org/leednd>.

Congress for the New Urbanism, Natural Resources Defence Council and the U.S. Green Building Council. (2009). LEED 2009 for Neighbourhood Development.

Correctional Service of Canada (CSC-SCC). 2007. Institutional Profiles. <http://www.csc-scc.gc.ca/text/region/inst-profil-eng.shtml#ontario>. [September 29, 2009].

Crowder, A.A., J. P. Smol, R. Dalrymple, A. Gilbert , A. Mathers and J. Price. 1996. "Rates of natural and anthropogenic change in shoreline habitats in the Kingston Basin, Lake Ontario. Can". *J. Fish. Aquat. Sci. 53:*121-135.

Cumming + Company. 2007. "City of Kingston Official Plan Review Summary Feedback Report: Input received on the Agricultural Study". < http://www.cityofkingston.ca/pdf/planning/agriculture/AgStudy_A-Feedback.pdf>.

Environment Canada and Central Ontario Conservation Authority. 2004. *Durham Region Coastal Wetland Monitoring*. Year 2 Technical Report. Downsview.

Food miles gathered from: Sunny On Lam, MES. July 31, 2006. *Food Miles: Environmental Implications of Food Imports to the Kingston Region. Brief Summary of Findings and Comparison to Waterloo Region. Kingston, ON.* August 7th, 2007 (This is excluding the bun for the burger as that information was unavailable).

Gibson, R. 2006. "Beyond the Pillars: Sustainability Assessment as a Framework for Effective Integration of Social, Economic and Ecological Considerations in Significant Decision Making." *Journal of Environmental Assessment Policy and Management, 8* (3): 262.

Girardet, Herbert. 2004. *Cities People Planet*. England: Wiley-Academy.

Grange, Mark. (2005). Kingston *Model for Action – Affordable Housing Supply Final Report*. City of Kingston. <http://www.cityofkingston.ca/pdf/housing/kmahd/KMAHD_FinalReport-Feb2005.pdf>.

Government of Ontario. 1990. *Conservation Authorities Act*. http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_90c27_e.htm

Government of Ontario. 2005. *Provincial Policy Statement.*

Kaufman, Jerome. *Food System Planning, Moving up the Planner's Ladder*. Plan Canada, Summer 2009.

Kitchen Gardeners, 2009. Accessed October 27th, 2009. <http://my.kitchengardeners.org/forum/topics/economics-of-home-gardening>.

Kingston Economic Development Corporation. 2000. *Environment and Lifestyle*. City of Kingston.

Kingston Economic Development Corporation. 2000. *Economic Base Profile, City of Kingston.*

Kingston Economic Development Corporation. 2008. *Statistical Profile.*

Kingston Field Naturalists. 2004. *Report on Little Cataraqui Creek Wetland, West Side, Front Road to Bath Road.* Coordinator: Sharon Critchley. Kingston, Ontario.

Lam, Sunny On. *Urban Agriculture in Kingston: Present and Future Potential for Re-Localization and Sustainability*. Master's Thesis. Queen's University, 2007.

McNeely, Jeffrey and Sara Scherr. (2003). *Ecoagriculture: Strategies to Feed the World and Save Wild Biodiversity*. London: Island Press.

McBay, A., Grinvalds H., *From the Ground Up, A Primer for Community Action* October 1st, 2007, Kingston, Canada

Ministry of Agriculture, Food and Rural Affairs. Government of Ontario. 2009. "Classifying Prime and Marginal Agricultural Soils and Landscapes: Guidelines for Application of the Canada Land Inventory in Ontario." Government of Ontario. <www.omafra.gov.on.ca/english/landuse/classify.htm>. [October 6, 2009].

Ministry of Municipal Affairs and Housing. 2009. "Planning by design: a healthy communities handbook". <http://www.ontarioplanners.on.ca/content/Publications/innovativepolicypapers.aspx>.

Ministry of Natural Resources. 2009. "Natural Heritage Reference Manual. 2nd Edition." Working Draft May 21, 2009.

Ministry of Natural Resources. 2009. "Species at Risk in Ontario (SARO) List." Government of Ontario. <www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/276722.html>. [October 4, 2009].

Muthiah, A. and Wood, R. 2004. Kingston Profile 2004: Economic Base. Kingston Economic Development Corporation.

National Farmers Union. 2009. Media Advisory - Monday, June 1,2009: Campaign to Save Canada's Prison Farms Goes National. <http://www.nfu.ca/press_releases/press/2009/June-09/Campaign%20to%20save%20Canada's%20prison%20farms%20goes%20national.pdf>. [October 19, 2009].

OMAFRA (Ontario Ministry of Agriculture, Food and Rural Affairs). *Introduction to Organic Farming*. November, 2006. <http://www.omafra.gov.on.ca/english/crops/facts/06-103.htm#trans> [November 10, 2009].

Ritchie, J. 2003. *Little Cataraqui, Butternut and Abbey Dawn Creeks. Stream Assessments 2003*. Ontario Ministry of Natural Resources. Kingston.

Royal Ontario Museum. 2008. "Species at Risk: Least Bittern." <www.rom.on.ca/ontario/risk.php?doc_type=fact&id=104&lang=en>. [October 4, 2009].

Rubin, Jeff. Why Your World is About to Get a Whole Lot Smaller. Oil and the end of globalization. Random House Press, 2009.

School of Urban and Regional Planning. 2009. Site Visit, September 25, 2009.

StatsCan. 2006. Quick agriculture profile for Kingston, ON. < http://www26.statcan.ca:8080/AgrProfiles/cp06/Table1.action?prov=35&geog_id_amal=350410010&tab_id=1&search=search&offname=Kingston&placename=kingston&loccode=22090&placestart=0&geog_id=350410010>.

StatsCan. 2009. Snapshot of Canadian Agriculture. <http://www.statcan.gc.ca/ca-ra2006/articles/snapshot-portrait-eng.htm>.

Steinman, John. Deconstructing Dinner, 2009. <http://eriewire.wordpress.com/2009/07/08/prison-farms/>.

The Conference Board of Canada. 2008. "Economic Insights Into 27 Canadian Metropolitan Economies." *Metropolitan Outlook 2*.

Thurston, Lance, City of Kingston. 2008. "Information Report to Planning Committee: Population and Housing Forecast Based on 2006 Census Data" *City of Kingston Report PC-08-083*.

Thurston, Lance. (2008). *City of Kingston Information Report to Planning Committee: Population and Housing Forecast Based on 2006 Census Data*. <http://www.cityofkingston.ca/pdf/cityhall/committees/planning/agenda/2008/PLN_A1708-SchedD.pdf>.

Toronto Food Policy Council. *Feeding the City from the Back 40: A Commercial Food Production Plan for the City of Toronto*. Toronto, 1999, p. 31.

Tsawwassen, British Columbia. *Southlands in Transition* website, accessed October 30, 2009. <http://www.southlandsintransition.ca/>.

Treasury Board of Canada Secretariat. 2006. Treasury Board Policy on the Disposal of Surplus Real Property. <http://www.tbssct.gc.ca/pubs_pol/dcgpubs/realproperty/dsrp-abie-PR-eng.asp?printable=True>.

U.S. Census, Internal Database. World Population 1940-2050. Accessed Oct 31, 2009. <http://www.census.gov/ipc/www/idb/worldpopgraph.php>.

Urbanmetrics inc. (2008) "Commercial Inventory and Market Analysis, Prepared for the City of Kingston".

Utilities Kingston. 2009. Public Information Centre for the Point Pleasant (Kingston West) Water Treatment Plant Expansion Schedule C Class Environmental Assessment.

VanCity and Three Point Properties & Windmill West. (2008). Dockside *Green Annual Sustainability Report*. <http://docksidegreen.com/images//dockside%20green%20sustainability%20report%202008-2.pdf>.

VanCity and Windmill West. (2006). Dockside *Green Housing Affordability Strategy*. <http://docksidegreen.com/images/stories/bottom/your-community-connections/Housing%20Affordability%20Strategy.pdf>.

Vreeken, W.J. 1994A. Ridged glaciolacustrine clay terrain near Kingston, Frontenac County. In (ed. R. Gilbert) *A Field Guide to the Glacial and Postglacial Landscape of Southeastern Ontario and part of Quebec.* Geological Survey of Canada Bulletin 453.

Winer, Leon. 2006. "A Model for Strategic Planning, Analyzing Cases and Decision Making." http://mbatoolbox.org/stories/storyReader$19. [November 29, 2008].

World Commission on Environment and Development. 1987. *Our Common Future*. The Bruntland Commission, UNESCO.

12.0 Image Credit

Section 6.2 Image Credit (via City of Ottawa, *Understanding Residential Density*, 2004)

Low Density

1. http://lh6.ggpht.com/RealGrouchy/R_V0GJ1o_nI/AAAAAAAABJk/DRnOkwy3TZA/s400/Images+of+Centretown+2008-03-30+(9).JPG.jpg
2. 43 Sweetland Avenue. <http://www.robmarland.com/DetailedListing.cfm?ListingID=201>

Medium Density

1. 223 Patterson Avenue. The Glebe. < www.robmarland.com/DetailedListing.cfm?ListingID=160>
2. 96 Frank St. Unit <www.robmarland.com/DetailedListing.cfm?ListingID=273>
3. 63 Third Avenue. The Glebe. <www.robmarland.com/DetailedListing.cfm?ListingID=259>

High Density

1. 457 McLeod Street. Unit 202. www.robmarland.com/DetailedListing.cfm?ListingID=215
2. 35 Holland Avenue. Unit 811. <www.robmarland.com/DetailedListing.cfm?ListingID=70>

Section 6.2.2 Image Credit:

Protected Area Features:

1. Wetlands – City of Salisbury, Australia, Watershed Wetland Trails and Tours, http://cweb.salisbury.sa.gov.au/manifest/servlet/page?pg=17919 , Panoramic Image: Authors' Collection
2. Observation tower – Waterfowl and Wetlands Trust, Bangpu Nature Education Centre
3. Eco passages - EcoPlans 2008. "Long Point Causeway Improvement Plan."

Residential Features:

4. Attached residential – Dockside Green, Victoria, BC, http://ecosistemaurbano.org/english/strategic-issues-clinton-climate-initiative-series
5. Detached residential – Proud Ground, Pardee Commons, Portland OR, http://www.proudground.org/node/204/index.html
6. Mid-rise residential – State Center, Madison Street Rendering, Baltimore, MD, http://www.statecenter.org/statecenter
7. Energy Efficiency, Passive Solar: http://www.planbecovillage.org/pictures/passive-solar-lrg.jpg

Agricultural Features:

8. Agricultural Transitions from residential to protected areas: http://4.bp.blogspot.com/_Ymx9e66vrGc/R_EORUk7JyI/AAAAAAAABvQ/HbFwgdaYMkE/s400/HCA_agriculture.jpg
9. Edible Landscape, Deirdre Moen, Accessed from Flickr, http://images.google.com/imgres?imgurl=http://farm3.static.flickr.com/2560/3783593298_917099e983.jpg&imgrefurl=http://flickr.com/photos/muhe-e/3783593298/&usg=__YexgGk48V8I1kPLhjL2JTpFe9BY=&h=500&w=375&sz=198&hl=en&start=293&sig2=tciGRpCR1PYVNtODwD29SA&um=1&tbnid=WH5vkVSFKqVI3

M:&tbnh=130&tbnw=98&prev=/images%3Fq%3Dedible%2Blandscaping%26ndsp%3D18%26hl%3Den%26rlz%3D1G1GGLQ_ENXX254%26sa%3DN%26start%3D288%26um%3D1&ei=HXoUS-SFAs-6lAe_3syfBQ

10. Community gardens – Ainslie Wood/Westdale Community Association of Resident Homeowners Inc., http://www.awwca.ca/stockphoto/detail/3
11. Sacramento Area Community Garden: http://www.saccommunitygardens.org/images/0254focg.jpg

Community Facility and Infrastructure Features:

12. Bike lane – Canadian cycling blog: Greener and Leaner, http://canadabike.blogspot.com/2007_11_01_archive.html
13. Swales – Washington State Department of Ecology, http://www.ecy.wa.gov/programs/wq/stormwater/municipal/permitMOD.html
14. Transit - City of Jefferson Missouri Transit, http://www.jeffcitymo.org/transit
15. Education Centre – Omega Institute Zero-Impact Education Centre, http://www.ecofriendlymag.com/sustainable-transporation-and-alternative-fuel/omega-institute-turns-on-americas-first-zero-impact-living-building
16. Recreation Centre – City of Esquimalt, Parks and Recreation, http://www.esquimalt.ca/parksRecreation/facilities/esquimaltRecreationCentre

Section 7.2.2 Image Credit from left to right, top to bottom:

Trail Features

17. http://www.kingstonist.com/images/2009/jan09/19jan_littlecat.png
18. www.regardingplace.com
19. http://www.friendsofthefarm.ca
20. http://www.flickr.com/photos/f1design/3461768746/
21. www.regardingplace.com

Agricultural Features

1. www.friendsoftheubcfarm.wordpress.com/
2. www.Rootsdown.ca/location
3. www.friendsoftheubcfarm.wordpress.com/
4. www.friendsoftheubcfarm.wordpress.com/
5. www.friendsoftheubcfarm.wordpress.com/

Community Garden Features

1. http://www.esquimalt.ca/parksRecreation/facilities/
3. http://www.buffalorising.com/assets_c/2009/05/Urban-Farm-Buffalo-NY-thumb-505xauto-2963.jpg
4. http://www.michaelcorbettmasterbuilder.com/village.html

Community Facility Features

1. http://www.sdgfp.info/Wildlife/Education/OutdoorCampusWest/index.htm
2. http://www.kawarthakennelclub.com/farmersmarket.jpg
3. http://ecologypark.greenup.on.ca/displays.html
4. commercialkitchenrental.files.wordpress.com

Protected Area Features

1. http://www.treesontario.ca/programs/index.php/workbook
2. www.redgardingplace.com
3. TBD

Residential Features

1. www.builderonline.com
2. www.cmhc.ca
3. www.regardingplace.com