

Identifying Land for Community Gardens in the City of Victoria:  
Exploring the Process of Creating and Conducting an Urban Agriculture Land Inventory

by

Jennifer Anne Sauter  
B. A., Wilfrid Laurier University, 2007

A Thesis Submitted in Partial Fulfillment  
of the Requirements for the Degree of

MASTER OF ARTS

in the School of Environmental Studies

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University of Victoria

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## **Supervisory Committee**

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### **Supervisory Committee**

Dr. Valentin Schaefer (School of Environmental Studies)  
**Supervisor**

Dr. Trevor Lantz (School of Environmental Studies)  
**Departmental Member**

## Abstract

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The City of Victoria is experiencing increased food insecurity due to its location on Vancouver Island in British Columbia, and a lack of food production in the city. The practice of urban agriculture presents a potential solution, enhancing food security by localizing resources, while increasing access and participation with local food production. Based on urban agriculture land inventories (UALIs) conducted in Portland, Vancouver and Nanaimo, my research evaluates and develops site selection criteria specific to Victoria for conducting a community garden land inventory focused on identifying land for allotment and commons gardens. I also examine the underlying barriers or supports for allotting land to urban agriculture in Victoria. To generate site selection criteria and explore the barriers and supports, I conducted interviews with urban agriculture experts, including city planners; community garden activists, educators and individuals involved in non-profits, and urban producers engaged in urban food production. The site selection criteria were further assessed as primary criteria for their application in GIS or secondary criteria to be considered during site visits. The final primary site selection criteria were land use and type, water availability (within 6.8 m), proximity to density users (within 400 m), minimum size thresholds of 1189.2 m<sup>2</sup> for allotment gardens and 139.4 m<sup>2</sup> for commons gardens, and excluding buildings, heritage designations, and protected green space. The analysis of the primary criteria resulted in a map illustrating 248 potential sites for community gardens in Victoria, whereby 213 were only suitable for commons gardens and 35 were suitable for allotment or commons gardens due to the larger size threshold. Four of the resulting sites were ground-truthed using site visits, and had medium to high potential for community gardens. The site visits documented secondary criteria, including proximity to community hub or prominent location, sunlight, ecologically sensitive area, cedar trees, and pollinator habitat or vegetation. Highlights from the interviews included

identifying the most influential factors to allotting land to urban agriculture: the perception and awareness of urban agriculture, the community, the politics of City Council and staff support, and the costs or financial supports associated with community gardens. Overall, this research provides a model for the decision making process behind establishing an UALI, and contributes to understanding the challenges to allotting land to agriculture in the urban environment.

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## Dedication

To my grandmother, Elisabeth Sauter.  
Her strength and wisdom are a constant source of inspiration in my life,  
and she will always be remembered.

## Chapter 1: Introduction

Rapid urbanization raised serious questions about the sustainability of cities, because the population growth increases a city's reliance upon external resources to support the urban system. Urbanization is accompanied by increasing migration from the rural fringe to urban metropolitan areas (Flavin, 2007). In 2010 more than 50% of the world's population lived in cities, while in North America it is more than 82 % (Belsky, 2012). The increase exceeds many cities' existing infrastructure, as they can barely contain the burgeoning populace, and it has led to the issues of urban sprawl, mass slums and rural decay (Sawin & Hughes, 2007; Bueren, Bohemen, Itard, & Visscher, 2012).

Cities are also quickly becoming points of resource intensification due to the escalating demand on natural resources, land and water, for continued growth. In the context of the ecological footprint, Rees (1999) describes this demand as a dependency on the "global hinterland of ecologically productive landscapes", emphasising that the: "increase in per capita energy and materials consumption made possible (and required by) technology, and universally increasing dependencies on trade, *the ecological locations of high-density regions no longer coincide with their geographic locations*" (1999, p. 36).

Rees' concept is clear: the globalization of cities has extended their capacity and rate of consumption beyond the extent of the local, intrinsic ecological limitations. This extends to a city's food system as well, as cities derive much of their food from the hinterland, and have become increasingly reliant upon the globalization of the food system to obtain food from abroad (Fresco, 2009). Excluding the production of food from urban centres in has also contributed to the loss of local food production and the globalization of the food system.

The globalization of the food system has led to a cultural, social, economic and environmental divide between producers and consumers. Local food has become marginalized for cheap, subsidized imports, travelling perhaps thousands of miles from the point of origin before reaching the consumer (Paxton, 2005; Pollan, 2006; Grewal & Grewal, 2011). The treatment of food as a market commodity, rather than a "necessity of life" (People's Food Policy Project, 2011) has undermined local food and devaluated its significance to the consumer through the year round availability of imports, limiting local



producers' access to markets (Koc & Dahlberg, 1999), and advancing the perception of local as expensive compared to imports (Wallinga, 2009, p.273), when they are indeed reflecting the true market value if full cost accounting was invoked (Patel, 2010).

The global food system is also reaching its economic and environmental limits of sustainability due to the current industrial model of agriculture's dependence upon fossil fuels to produce and transport food (Roberts, 2008). Industrial agriculture degrades both global and local ecosystems, and the system's ability to produce food is increasingly plagued by disease, contaminants, and health and safety concerns (Godfray et al., 2010).

The dependence on fossil fuels makes the current industrial model of agriculture economically unsustainable because they are a finite resource with an increasing cost driven by scarcity. The price of oil now hovers around \$100 per barrel, a threshold which represents an economic "danger zone" if surpassed (Kemp, 2012). The rising cost of oil has been exacerbated by growth of the biofuels industry (Ghosh, 2010) and stochastic climate events, and contributed to a food price crisis of 2008 where the price of food escalated to new heights (Ghosh, 2010; Headey & Fan, 2008 & Redwood, 2010). The inflated cost of food increases food insecurity, as the price of staple foods consumes a greater percentage of an individual's income (OECD and Food and Agriculture Organization of the United Nations, 2013 & Dieticians of Canada, 2012).

The environmental, cultural, social, and economic implications of the globalized food system have created the need for an alternative, sustainable, human-scale food system (Condon, Mullinix, Fallick, & Harcourt, 2010). One key question that has arisen is: how will the food requirements of a city be met in the future? In response, many cities around the globe have turned towards the re-integration of urban agriculture into their infrastructure (Brown & Carter, 2003; Shackleton, Pasquini & Drescher, 2009; Viljoen, Bohn & Howe, 2005; Mougeot, 2005; Smit, Ratta & Nasr, 1996 & Thibert, 2012). Urban agriculture addresses each of the aforementioned issues, including the increasingly concentrated populations in cities, the global food system's disconnect and unsustainability. With the population of cities growing, urban agriculture decreases the distance food travels, making it closer to the source and providing greater opportunities for waste cycling (Parrot, Sotamenou, Kamgnia, & Nantchouang, 2009).

In contrast to the global food system, urban agriculture localizes resources and scales production to a sustainable level, creating greater connections with producers and consumers. A prime example of this is Cuba's food revolution of the 1990s, during the *Periodo Especial*, whereby the country experienced 'peak oil' when their key trading partner, the Soviet Union, collapsed. This caused severe shortages of oil imports, as well as fertilizers and machinery, forcing Cuba to localize food production from rural industrial to small-scale urban (Morgan, 2006). Cuba's shift to urban agriculture was encouraged by the government, which passed laws allowing for the public occupation of vacant land or underutilized land to be put into agricultural production. Thus, allowing Cuba's cities of Havana and Villa Clara to become urban hubs capable of producing up to 70 percent of their food on urban and peri-urban land (Altieri & Funes-Monzote, 2012).

Cities across Canada have also begun to support food production in urban areas by promoting and engaging in urban agriculture, and through innovative municipal policy (Edible Strategies Enterprises Ltd., 2007). Major urban hubs such as Vancouver, Toronto, and Montreal are experiencing an increase in community and individual participation in urban agriculture, and are globally recognized for their ongoing and progressive support of community and rooftop gardens (True Consulting Group, 2007). A study in 2001 confirms this movement, as gardening was cited as the "fastest growing recreational activity amongst urban residents" in Toronto (Wekerle, 2001, p.36). The motivation for participating in urban agriculture can be attributed to the many individual benefits of healthy eating, exercise, and education; the community benefits of food security, site restoration, and connecting with community members in a safe and social space (Lawson, 2005).

### **1.1 Urban Agriculture Land Inventories**

With increased participation in urban agriculture and the recognition of its benefits comes the need for more gardening space. However, creating new sites is complex as open space or vacant land can be a scarce commodity in the built-up urban environment. Even if tracts of land appear available, acquiring access poses a challenge because of the competition for space, inflated property values, or the land has been purposed for development.

An emerging solution in cities is to conduct an urban agriculture land inventory (UALI) of all the land with the potential for urban agriculture. Mendes, Balmer, Kaether and Rhoads (2008) examined the use of public land inventories in Vancouver, British Columbia and Portland, Oregon, as an effective means of developing criteria to identify land for urban agriculture and include such lands in planning. The UALIs determined viable locations for the practice of urban agriculture through an analysis of city land based on remotely sensed (RS) images, GIS surveys, and the desired physical and social characteristics of potential sites. Although the Vancouver and Portland UALIs utilized the qualitative knowledge of locality derived from determining appropriate communities to support urban agriculture, the inventories largely approached urban agriculture from another angle: the ground up. This approach is valuable because it addresses the most prominent barriers to the practice of urban agriculture: the lack of identified accessible and suitable land (HB Lanarc – Golder, 2013 & Thiebert, 2012). Identifying land for urban agriculture would also be more compelling for developers, municipalities and communities to establishing new garden sites (Pothukuchi & Kaufman, 2000). The resulting report and site maps from the inventories enhanced public dialogue, created new opportunities for urban food production, and elevated urban agriculture to a priority on the municipal planning agenda (Mendes et al., 2008, p.443).

Like Portland and Vancouver, Victoria has an active gardening community and an increasing number of individuals participating in urban agriculture. Of the many different styles of urban agriculture, the most prevalent are community gardens in the form of allotment and commons gardens. With increasing participation in community gardens, the need to access land increases, generating a demand to identify sites and create more gardening space (City of Victoria, 2012).

Furthermore, Victoria is experiencing increased food insecurity due to its location on Vancouver Island and the lack of food production in the city (Bouris, Masselink, & Geggie, 2009). Community gardens present a partial solution, enhancing food security by localizing resources, while increasing access to and participation with local food production. Victoria's *Official Community Plan* also recognizes the need to increase food security, and seeks to establish more community gardening spaces and support the development of urban agriculture throughout the city (City of Victoria, 2012).

The purpose of this study is to develop an UALI for the City of Victoria in British Columbia, Canada and to explore the barriers and supports influencing the process of allotting land to urban agriculture, specifically the community garden style of allotment and commons gardens. Conducting an UALI in Victoria will identify potential sites for allotment and commons gardens while supporting the OCP's objective to become more food secure. The process of determining site selection criteria for the UALI will also bring to light the issues surrounding allotting land to community gardens, examine the socio-economic barriers to urban agriculture and explore approaches to conflict resolution. It will engage and enhance the debate around the potential for food production in Victoria. An inventory will also contribute to understanding the utility and significance of UALIs as a tool for stimulating the creation of new community gardens.

## **1.2 Thesis Objectives**

For the reasons cited above, this study endeavors:

*To evaluate and develop site selection criteria for identifying land with the potential for community gardens within the City of Victoria.*

The study was guided by the following two questions:

- 1) *What selection criteria can be applied to determine suitable sites for community gardens in the City of Victoria?*
- 2) *What underlying barriers or supports are there for allotting land to urban agriculture in the City of Victoria?*

## **1.3 Methodology**

A mixed methods approach was used to fulfill the main research objective and satisfy the research questions stated in Section 1.2. This included a literature review to define and understand the role of urban agriculture and community gardens in Victoria, examine how community gardens contribute to food security and food self-reliance, and review the characteristics of existing UALIs to generate site selection criteria. Semi-

structured interviews with local urban agriculture experts and a GIS analysis were then employed to refine the site selection criteria, determine the barriers and supports for urban agriculture in the City of Victoria and to identify sites suitable for community gardens.

While this study originally considered a range of urban agriculture activities for the inventory, the initial interviews revealed the breadth and quality of data required to inventory sites for urban agriculture would prove problematic for completion at the scale of Masters research. The lack of time and resources, as well as the amount of detail required to successfully execute an extensive inventory of different types of the urban agriculture, was too large a project to undertake at this time. I decided it was more appropriate to survey the commons and allotment style of community gardens because they were prevalent throughout Victoria and there was an established need for more land by this user group (Kelly & McGrath, 1988). Although I came to this realization after conducting and transcribing the first few interviews, it was remedied by clearly stating the refined objective at the onset of each succeeding interview.

The following outline provides a summary of the methods used in this research, with each step elaborated upon further in subsequent chapters:

- 1) Conducted a literature review of urban agriculture, community gardens, and food security in the context of the City of Victoria (Chapter 2)
- 2) Surveyed the approach and methods of 19 UALIs in North America (3.2 and 3.3).
- 3) Conducted a focused literature review of UALIs conducted in the Pacific Northwest of North America, in the cities of Portland, Vancouver and Nanaimo (3.4).
- 4) Developed semi-structured interview questions based on the focused literature review of Nanaimo's UALI (4.2).
- 5) Interviewed individuals directly or indirectly involved with urban agriculture and community gardens in the City of Victoria to determine site selection criteria, potential barriers and supports to allotting land to urban agriculture (4.2).
- 6) Established interviewee's priority site selection criteria based on content analysis and multi-criteria evaluation (MCE) of responses (Chapter 5).

- 7) Interpreted interviewee's criteria into GIS, implemented final site selection criteria using ArcMap and aerial photos to determine sites suitable for the establishment of community gardens (6.1-6.4).
- 8) Conducted site visits to document site suitability and profile characteristics (6.4).

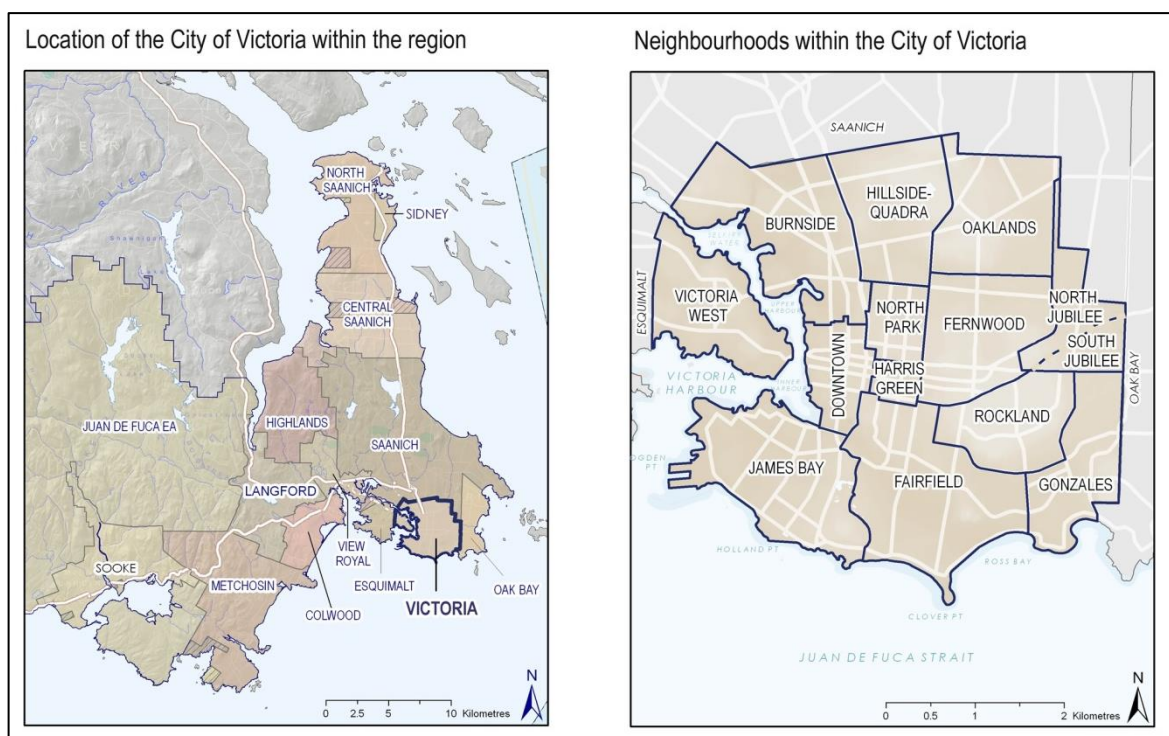
#### **1.4 Thesis Organization**

This thesis is organized into seven main components. Having introduced the research, Chapter 1 now turns to examine the context of the intended research, outlined in the methods and research designs, and describes the City of Victoria. In Chapter 2, I provide a literature review examining the evolving definitions of urban agriculture, and explore food systems theory through the concepts of food security and food self-reliance. Chapter 2 also focuses on the allotment and commons style of community gardens, where I examine the role of community gardens and policies relating to urban agriculture activities in Victoria. I conducted a comprehensive literature review of the existing UALI's approaches, methods and outcomes in Chapter 3, the results of which were used to delineate the qualitative enquiry process for Chapter 4. Chapter 4 elucidated the interview design, where I outlined how stakeholder groups and interviewees were selected, and described each question's development and interview analysis. I interpreted the interview results in Chapter 5 using content analysis and by summarizing and analysing individual and group responses to each question in order to develop corresponding site selection criteria. In Chapter 6, I utilized ArcGIS to refine and finalize the site selection criteria, then apply the UALI to identify sites suitable for community gardens. I profiled a few sites to illustrate the outcome of the inventory. This thesis concludes with Chapter 7, my discussion of recommendations and opportunities for further research.

#### **1.5 Study Area: City of Victoria**

The City of Victoria is located at the Southern end of Vancouver Island in the province of British Columbia, Canada. A colonial city, Victoria occupies traditional Coast Salish territories (City of Victoria, 2012b), and was established in 1848. In 1871 when the province joined Confederation, it became the capital of British Columbia. Victoria is also part of the Capital Region District (CRD), an area composed of thirteen

municipalities and three electoral areas, centered on the City of Victoria but extending north to Salt Spring and the Gulf Islands, and west to include Port Renfrew (CRD, n.d.). The City of Victoria contains 14 neighbourhoods: Victoria West, Burnside, Rock Bay, Hillside-Quadra, Oaklands, North and South Jubilee, Downtown, North Park, Harris Green, Fernwood, Fairfield, Gonzales, James Bay and Rockland (City of Victoria, 2009a, June). The location of Victoria in the CRD and the neighbourhoods composing Victoria are featured in Figure 1.



**Figure 1:** Community Profile Orientation identifying the location and neighbourhood boundaries of the City of Victoria (City of Victoria, 2011a).

Victoria is a well-known and popular international tourist destination, with over 3 million visitors annually (City of Victoria Annual Report, 2011). Downtown businesses cater to the tourist industry, relying upon the cruise ships and seasonal tourism to contribute to the local economy (Business Research and Economic Advisors, 2013). Though the impact of visitors on the local food supply is unknown and has not been studied, the sheer volume of individuals coming to the city makes it a significant point of consumption in the region.

Victoria's climate can be described as cool-Mediterranean (Forward, 1979), with hot dry summers and the mildest winters in Canada (Environment Canada, 2012).

Although the annual average precipitation is 88.3 cm, precipitation is low during the summer months, creating a water deficit which limits soil moisture and the potential for organic food production (Statistics Canada, 2007; Klinka, Nuszdorfer, & Skoda, 1979; Packee, 1974). Irrigation is required during the summer months to compensate for this deficit. In addition, the temperate climate of Vancouver Island has the received title of "longest growing season in Canada", spanning from "early March until late November" (Day, Farstad & Laird, 1959, p.163). With 2,183 hours of sunshine and an abundant annual rainfall, food can be grown all year (City of Victoria, 2012a).

Victoria's location on the south-eastern side of Vancouver Island is also within the rain shadow of the Olympic and Vancouver Island Mountains, producing a dry climate zone (Packee, 1974) which allows for the dominance of the Coastal Douglas-fir (CDF) Biogeoclimatic Zone (Nuszdorfer, Klinka, & Demarchi, 1991). The soils of the CDF zone are described as varying in topography and drainage, and producing very different "soil type[s] over relatively short distances" (Day, Farstad & Laird, 1959, p. 162). In terms of plant growth, the Plant Hardiness Zones (PHZ) indicates Victoria is considered 9a (1967), with recent calculations from the Victoria Gonzales-Heights station indicating 8b (2000) (McKenney & Campbell, 2002, p.3).

In combination with the CDF Biogeoclimatic Zone is the Garry Oak Ecosystem. A significant cultural and ecological feature of Victoria's landscape, it is known for its gnarly Garry oak and expansive camas (*Camassia* spp.) meadows. It is comprised of deep soil parkland and shallow scrub Garry oak communities (Lea, 2006 & CRD, 2012), ranging from large groupings in parks or public spaces, to single stands amongst backyards and roadways. The cultural significance of the Garry oak was derived primarily from the First Nations' use of camas as a staple carbohydrate, resulting in the burning of Garry oak habitat to prevent the succession of other trees and shrubs, and to:

...promote the growth of edible root crops, such as camas and bracken fern (*Pteridium aquilinum*), and to create openings for hunting ungulates, such as deer and Roosevelt Elk (*Cervus canadensis roosevelti*) (Eastman, Webb & Costanza, 2011, p. 27).



A more recent cultural history is outlined in Cavers' (2009) graduate thesis, stating Garry oaks are: symbolic of British identity, part of the "Euro-American tradition of aesthetic appreciation" valuing them as street and park trees, as well as the desire to preserve the native ecosystem (p.67). With less than 5 percent of the original habitat remaining in natural condition, the Garry oak ecosystem it is one of the most endangered ecosystems in Canada (Lea, 2006, p.34). In the City of Victoria, the loss of Garry oak is described as a "charismatic victim of environmental change", as it remains a direct symbol of how urban and agricultural expansion has led to habitat fragmentation, degradation and decline (Cavers, 2009, p.67).

Despite a seasonal drought, the climate, landscape and soil conditions are optimum for gardening all year, and entitle Victoria the "City of Gardens" with the abundance of public and private gardening spaces in production (Tourism Vancouver Island, n.d., p.2).

## **Chapter 2: Status of Urban Agriculture in Victoria**

This chapter examines the key definitions and concepts essential to understanding the role of agriculture in an urban context. The main form of urban agriculture discussed is community gardens with an emphasis on allotment and commons gardens. The current policies shaping the role of urban agriculture in the City of Victoria are also delineated.

Food systems theory is explored through the definitions of food self-reliance and food security by questioning their capacity for accurately representing the sustainability in the food system. The chapter concludes with examples of community gardens supporting food security and food self-reliance in cities around the world.

### **2.1 Defining Urban Agriculture**

The concept of urban agriculture varies across scale, culture, geography and climate, and is unique to each urban architectural landscape. The most basic definition of urban agriculture is “the growing of plants and the raising of animals within and around cities” (Resource Centre on Urban Agriculture and Food Security, n.d.). To elaborate, the following definition of urban agriculture (UA) by the International Development Research Council (IDRC)’s Senior Program Specialist Luc A. Mougeot is a reworking of Jac Smit’s initial definition from 1996, focusing on the cycling of urban wastes within UA:

An industry located within (intra-urban) or on the fringe (peri-urban) of a town, a city, or a metropolis, which grows or raises, processes, and distributes a diversity of food and non-food products. It (re)uses on a daily basis human and natural resources, products, and services largely found in and around that urban area and, in turn, supplies on a daily basis human and material resources, products, and services largely to that urban area (Mougeot, 1999, p.10).

Though conceived in 1999, Mougeot’s definition remains an accurate description of urban agriculture because it encompasses a range of activities, processes and scales at which urban agriculture can occur. As such, urban agriculture can manifest in a multitude of forms such as: balcony, rooftop or container gardens, backyard chickens and small livestock, food forests, fruit trees, boulevard commons, shared commons, private allotment gardens, edible landscaping, small plot intensive (SPIN) farming, school

gardens, First Nation gardens, Heritage gardens, small-scale farming, hobby beekeeping, and permaculture gardens (Stevenson, personnel communication, 2010). The variety of forms stated represents a sample, from the most basic to the more novel and diversified styles, of urban agriculture currently emerging in cities throughout the globe.

A research paper by the Community Food Security Coalition's North American Urban Agriculture Committee further refines the definition of urban agriculture based on the different forms of participation and the intended outcome. The committee identified three principle types of participation in urban agriculture: commercial, community, and backyard gardens (Brown & Carter, 2003, p.11). This section focuses on community gardens and their role in the City of Victoria.

### **2.1.1 Community Gardens**

A community garden is defined as a plot of public or private land gardened by a group of people, such as community volunteers or a non-profit society, for the purpose of producing food or flowers (City of Victoria, 2009b). Located in urban, suburban, and rural settings, they are often overseen by a school, hospital or neighbourhood association (American Community Gardening Association, n.d.). The group responsible for overseeing a community garden typically provides members with access to plots, services such as water, composting, and shared tools. This is usually in exchange for a small fee or volunteer labour (City of Victoria, 2009b). Many community gardens encourage activities such as work parties, fundraisers, and social gatherings to help members engage with each other and continue learning together.

Similar to urban agriculture, there are many different sub-classes of community gardens. While each style of community operates with its own set of values and practices, and the characteristics commonly associated with the different types of community gardens are featured in Table 1.

**Table 1:** Types of Community Gardens (Barbolet, 2009).

Type	Description
<b>Allotment</b>	Publicly owned plots of land leased to individuals, common in many European countries.
<b>Community shared gardens</b>	Collectively-run gardens with communal plots in which garden members share the responsibility of growing and harvesting the food.
<b>Backyard gardens</b>	Privately owned land on residential properties. It may be shared or leased to community members based on the landowners consent (i.e. LifeCycles' Sharing Backyards)
<b>Temporary gardens</b>	Community gardens existing on sites intended for future development. Approval is advised, as developers may contribute to the community gardens on vacant lots for a fixed or open term until building commences. <b>Guerilla gardens</b> are also a form of temporary garden, yet they are often created [in underutilized spaces on public or private land] without explicate permission of the property owner.
<b>Boulevard gardens</b>	Defined by the City of Victoria as the "grassy strip of land between a property and the street owned by the City" whereby the "majority of boulevards have grass and trees between the sidewalk and the curb" (2009a).
<b>Healing gardens</b>	These gardens are created with a therapeutic purpose to treat spiritual, mental, or physically illness.
<b>Community orchards</b>	Fruit trees managed collectively in a similar manner to community gardens.
<b>Victory gardens</b>	Established as patriotic gardens of World Wars I and II to promote food security and local food production.
<b>Institutional gardens</b>	Community food gardens at schools, hospitals, prisons, or seniors' homes providing food, education, training, or therapeutic relief.
<b>Community Food Forest</b>	Community food forests are landscaped to provide specific layers of plants, shrubs and trees bearing food. The Spring Ridge Commons and Wark Street Common are known as edible landscapes and food forests because of their design.

### Community Gardens Policy

The City of Victoria's *Community Gardens Policy* defines a community garden as:

...a plot of land where community volunteers from a non-profit society produce food, flowers, native and ornamental plants, edible berries and food perennials on public or private lands (2009b, p.2).

This definition encompasses a diversity of land based urban agriculture, and in particular, commons and allotment gardens. The policy delineates the expectations of tenure associated with different types of land ownership in Victoria. It also outlines the City's recommendations for establishing community gardens on public land, City-owned land and park land. The guidelines for selecting a new community garden site on public land are shown in Table 2, and consider the physical, social and temporal characteristics of a potential site. The most important of these is the demonstration of "interest and

commitment of a gardening group (non-profit), in partnership with a community association” (2009b, p. 3). The same conditions of use are applied to gardens on City-owned property and park land, with a community consultation and the development of the site at “no cost to the City of Victoria” (2009b, p.4).

**Table 2:** City of Victoria’s Community Gardens Policy’s Guidelines for Selecting New Sites for Community Gardens on Public Property (City of Victoria, 2009b, p.3).

<ul style="list-style-type: none"> <li>· Interest and commitment of a gardening group (non-profit), in partnership with a community association</li> <li>· Informed and supportive neighbours</li> <li>· Availability of the site</li> <li>· Volunteers willing to operate and manage the site</li> <li>· Year-round accessibility of the site</li> <li>· Soil quality and drainage</li> <li>· Sun exposure</li> <li>· Accessibility by public transit</li> <li>· Access to municipal water as per standard regulations and permits</li> <li>· Availability of [minimal] parking</li> <li>· Provide a public education component</li> <li>· Priority for new sites should be for neighbourhood areas that are underserved</li> </ul>
--

Most community gardens also have specific terms and conditions for participating, and require a signed waiver or contract to make the commitment official. In Victoria, community gardens on public, City-owned, and park land require a user agreement between a non-profit organization or neighbourhood association and the community garden members (2009b, p.4). In turn, the organization or association agrees to “develop, manage and operate the community garden”, while the members agree to the “terms of use, management responsibilities, user fees, and access procedures” (City of Victoria, 2009b, p.4). A basic fee for an allotment helps pay for access to utilities, and varies depending on the size of the plot and length of commitment. Some community gardens require a year, while the City of Victoria policy requires that the user agreement not exceed three years (City of Victoria, 2009b, p.4).

When I myself was looking for a plot in community gardens in Victoria in 2009, I found space in existing community gardens to be in high demand, and the wait lists for registering was up to two years long. The *Community Gardens Policy* encourages the creation of new gardens and will grant public space to groups with a potential site and proven community support. If a site is unavailable, but a community group has illustrated sufficient support for a new garden, the City Council may designate a site on public or

city-owned land (2009a). If a potential community garden site is selected, the City of Victoria also offers to perform a Phase 1 Environmental Analysis, assessing the history of the land and identifying if there are any past uses that could be hazardous to food production (2009). Furthermore, the policy requires that community garden participants do not use pesticides, produce is to be grown organically, and cannot be sold for private profit (City of Victoria, 2009b, p.4).

Overall, the *Community Gardens Policy* offers a simple and effective planning tool supporting community garden initiatives in Victoria (City of Victoria, 2009b). Since the policy's original publication in 2005, five community gardens have been successfully established. Furthermore, any limitations influencing the effectiveness of the *Community Gardens Policy*, they are addressed in Section 5.6.4.

### **Allotment Gardens**

The most common style of community gardening is the allotment, where plots are divided and assigned to individuals or groups to garden (MacNair, 2002). The history of allotment gardens in Canada is similar to the United States and Europe. Their evolution was documented by Quayle and Sangha (1986) who identified 6 eras: 1) from the 1890s railway gardens of the Canadian Pacific Railway; 2) to the rural school gardens at the turn of the century; 3) the encouragement of vacant lot gardening as part of national defence during the First World War; 4) the victory gardens of the Second World War; 5) the "counter-culture community gardening" (Fairholm, 1998, p. 10) and 6) an era where gardens were promoted as providing "community open space" (Iaquinta & Drescher, 2010 & Quayle and Sangha, 1986).

In the City of Victoria, the First World War instigated citizens to organize into a group called the "Victory Garden Brigade", who petitioned the Minister of Agriculture to allow Victory Gardens in the wake of food shortages. This led to the establishment of the *Greater Food Production Act* which allowed cities and municipalities "to take possession of vacant, unused tracts of land for cultivation purposes, without paying compensation to the owner" (Buswell, 1980:3). Herbert Warren, the Superintendent of Parks from 1931-1970, recalls sheep in MacDonald Park and the Beacon Hill Park parade grounds which were cultivated for potato fields (Buswell, 1980:3).

By the end of the Second World War, the national impetus to grow food in cities had declined as the rise of industrial agriculture was manifesting in the rural setting (Thibert, 2012, p. 350). In addition, growing food in cities declined because the perception of urban agriculture as a difficult practice reserved for the working class or individuals of low income without financial independence contributed to the social marginalization and devaluation of allotment gardens from backyards during the post-war years (Gaynor, 2006; Quayle & Sangha, 1986). As the allotments fell into neglect, the idle, underused or abandoned lands were sold into development or swept away by urban sprawl, with the remaining sites pushed away to the edge of the cities (Cosgrove, 1998; Brown, 2008).

Despite the loss of agriculture in the city, and peri-urban agriculture in the hinterland, many cities began trying to protect the remaining allotments and agricultural land, and to promote it as an integral part of the city's landscape. Since the 1970s, a counter-cultural shift renewed the desire for allotment gardens as part of greening the urban environment and using the gardens as open spaces (Fairholm, 1998). The gardens have also been utilized as part of urban renewal projects to make neighbourhoods safe, to create participatory spaces, and to "provide residents with a sense of nature, community, rootedness, and power" (Schmelzkopf, 1995, p. 364).

Today's interest in allotment gardening can further be attributed to the increasingly unstable economic climate since the recession of 2008. The creation of allotment gardens in marginalized, low income neighbourhoods has also sought to increase access to sufficient and healthy food for the urban poor (Iaquinta & Drescher, 2010). Thus, the importance of food production as an "insurance investment", coupled with the increased participation in gardening as a hobby, has rejuvenated interest in allotment gardens today (Iaquinta & Drescher, 2010, p.209).

### **Allotment Gardens in the City of Victoria**

As of 2012 the Victoria had 6 allotment gardens, representing the highest number of allotments in the Capital Region District (Bouris et al., 2009). The allotment gardens are privately or community run, with food grown for the "personal use of the gardeners" (Bouris et al., 2009, p.27), and occupy land owned by the City of Victoria, the Province of British Columbia, the Greater Victoria School District 61, or private businesses

(Bouris et al., 2009). In what follows, I describe the characteristics of the six allotment gardens currently operating in Victoria. It should be noted that the dimensions of each garden and individual allotment are commonly described by users in feet, therefore feet was used in each garden's profile as an acceptable measure and for consistency.

*1) James Bay Allotments (Montreal Street Allotments)*

The James Bay Allotment Gardens, also known as the Montreal Street Allotment Garden, is an allotment garden on City-owned land whereby users pay annual fees to the James Bay Garden Association for the management, tools, and fencing. It is believed to have been started in the late 1970s. Many gardeners are now growing all year, as the site manager has noticed winter veggies such as leeks, kale, and mustard greens appearing in the last 5 years (anonymous gardener, personal communication, October 13, 2012). The James Bay Allotment Garden has 54 allotments, measuring 10 x 12 feet each. An additional 7 garden plots (along the perimeters), are maintained by members of the James Bay Garden Association. The address is 210 Dobison. It is located near Montreal Street between Oswego and Niagara Street.

*2) James Bay Community Gardens (Michigan Street Allotments)*

The James Bay Community Gardens, also known as the Michigan Street Community Garden, is an allotment garden in the corner of the provincial government parking lot at Michigan and Menzies Streets. The James Bay Allotment Garden has 20 allotments, most of which are 4 x 18 feet, with five measuring 4 x 14 feet. It was created in 1999 when LifeCycles, the James Bay Community Project (JBCP) and community members approached the landowners, the British Columbia Buildings Corporation (BCBC). The garden was supported by the Ministry of the Environment, Lands and Parks with an initial 5 year lease agreement. As of 2012, the allotment garden had been in operation for over 13 years (James Bay Sustainability Commons, 2012). Although it is expected that the parking lot it occupies will eventually be built on, there is no guarantee that the garden will be saved. The lack of secure tenure classifies the James Bay Community Gardens as an interim or a temporary garden.



### *3) Earth Bound Community Garden*

Earth Bound Organic Community Garden is an allotment garden located on City-owned land, situated on Garden Street perpendicular to Bay Street. It is managed by the Fernwood Community Association (FCA) and has 20 plots. The site was not accessible at the time of the study as it is fenced off and locked against public access. However, most plots appeared to be approximately 4 x 16 (12), 10 x 10 (6) and 12 x 12 (2).

### *4) Fernwood Allotment Gardens*

The Fernwood Allotment Gardens is also operated by the Fernwood Community Association and is co-located with the Greater Victoria Compost Education Centre (GVCEC) at the intersection of Chambers and North Park. The garden has 34 plots averaging 16.5 x 8 feet each, and the perimeter is fenced to prevent vandalism due to its proximity to downtown. Illustrated in Figure 2, the Fernwood Allotment Garden has well-established garden plots and provides a thriving community and growing space as well.

### *5) Rayn or Shine Community Gardens*

The Rayn or Shine Community Garden in Victoria West operates at a much smaller scale than the other gardens, as it is an allotment garden with 9 plots measuring 4 by 12 feet in size. It was started in 2004 to “[transform] part of a garbage-filled parking lot” into raised beds behind the Spiral Café (Victoria West Community Association, n.d.). It also contains a commons garden bed that the public is welcome to harvest from.



**Figure 2:** Fernwood Allotment Gardens (personal photo, June 13, 2014).

#### 6) *Cecelia Ravine Community Gardens in the Burnside Gorge Community*

The Cecelia Ravine Community Garden was created in the spring of 2012 with grants from the City of Victoria and the Victoria Harbourside Rotary Club, and assistance from LifeCycles and the Burnside Gorge Community Association. It is an allotment garden on City-owned land in Cecelia Ravine Park with 24 plots, each measuring 3 by 12 feet. Of the 24, there are 3 of which are 4 feet high for individuals with mobility issues, a communal herb spiral and a large plot for groups at the community centre (K. Perkins, personal communication, November 19, 2012).

#### **Commons Gardens**

In conjunction with allotment gardens, commons gardens are recognized and supported as a style of community gardening practiced in Victoria. The term the ‘commons’ dates back to feudal England and Wales, “where the ‘waste’, or uncultivated land, of a lord’s manor could be used for pasture and firewood by his tenants” (Encyclopedia Britannica, 2013). The ability to access fallow or uncultivated land was granted as the right of common, and managed collectively by small landholders, a village

or a lord's court (Warde, 2004). The use of the commons was "unregulated until the 15<sup>th</sup> century" (Matthews, 2011), when the enclosure movement led to the privatization of land that resulted in the "abolition of communal forms of land ownership" (Warde, 2004, p.257).

While the state of the commons as prosperous or declining before enclosure remains unknown, the government's move to eliminate the commons left an enduring impression that they had indeed failed. Garrett Hardin favoured this perspective as well, arguing that "the end of the commons right was due to the inevitable over-use of commons lands, itself an economically logical result of sharing property rights in common" (Neeson, 1996, p. 6). The concept of the commons is prominently featured in Hardin's essay the *Tragedy of the Commons*, to exemplify the consequences of unchecked population growth, and has come to represent the earth's resources as a whole (Matthews, 2011; McCay & Acheson, 1987, p.xiii).

Despite the negative connotations attached to the *Tragedy of the Commons*, there is a growing environmental ethic towards managing the global commons expressed works such as the United Nations' World Commission on Environment and Development, *Our Common Future* (Brundtland, 1987). While the endeavor to measure the state of environmental decline and manage global resources remains an ongoing challenge, community level resource management initiatives have been successful (Matthews, 2011; McCay & Acheson, 1987). Examples such as the Boreal Forest Algonquian's game management (Brightman, 1987), and the Cree First Nations fisheries management, have "violat[ed] the assumptions of the commons paradigm" by their ability to successfully oversee the commons (Berkes, 1987, p.90).

Drawing on the historical and environmental context, it becomes evident that the concept of the 'commons' is more prevalent and widely supported as part of the modern discourse on the environment pertaining to issues of resource scarcity, privatization, population growth and limits to progress (Hardin, 1968; Brundtland, 1987; Ostrom, 1990).

In Victoria, the recognition of commons gardens has manifested in City policy and documents prepared by local neighbourhood associations. The most recent to highlight commons garden were the James Bay Neighbourhood Association (JBNA),

Fairfield-Gonzales Community Association (FGCA) and the City of Victoria's *Official Community Plan* (OCP). Commons gardens were recognized in the City of Victoria's OCP as:

...a plot of land where community volunteers produce food, flowers, native and ornamental plants, edible berries and food perennials on public or private lands, and where all citizens are free to harvest the products (2012b, p.255).

The OCP's definition of a commons garden reflects the qualities of existing commons gardens in the City of Victoria.

### **Commons Gardens in the City of Victoria**

As of 2012 the City of Victoria has 3 commons gardens. Though they produce food, such gardens are mainly for educational and recreational purposes (Bouris et al, 2009). An overview of each commons garden and the style of commons gardening are described in the section below.

#### *1) Spring Ridge Commons*

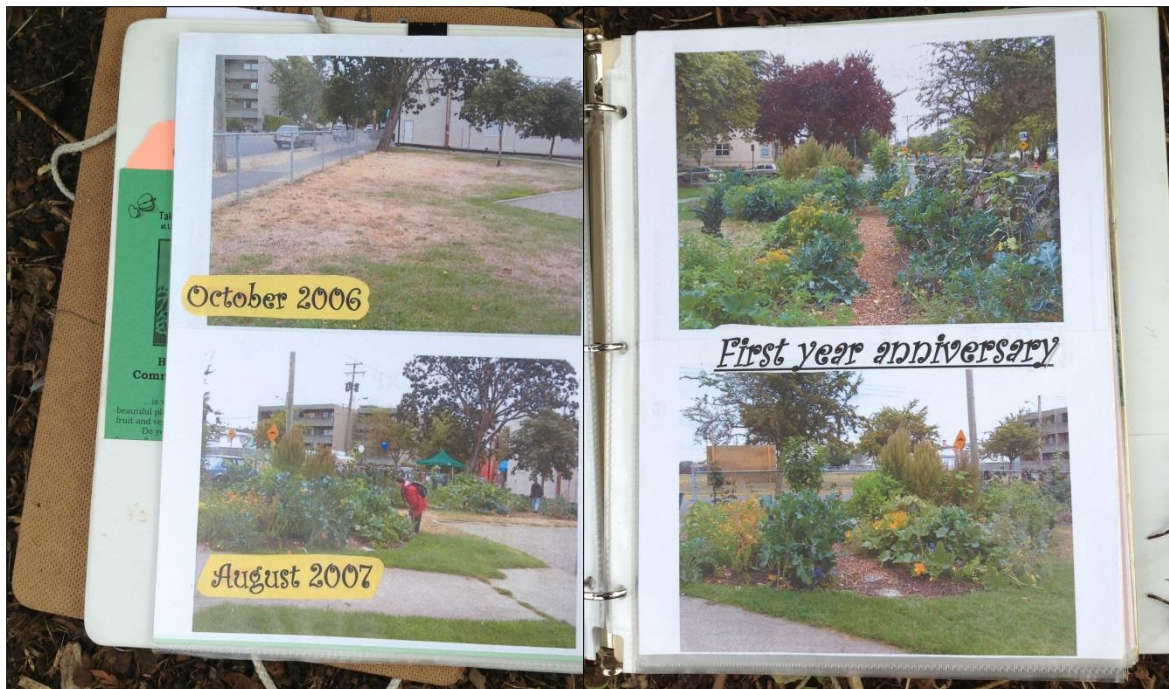
Spring Ridge Commons is widely referred to as an organic edible permaculture garden and an urban food forest. Conceived as a native plant garden, Geoff Johnson and the Fernwood Community Association began transforming the site in 1999. The garden was built upon a vacant school bus lot with a hard-packed gravel base (LifeCycles Project Society (b), n.d. & Transition Victoria, 2013). The site is the size of an average residential lot (115 x 134 feet) and is owned by the Victoria School District 61 but leased to the Fernwood Neighbourhood Resource Group (FNRG) for \$1 per year (Mallet, 2004). It is maintained by volunteer work parties overseen by the newly dedicated *Friends of Spring Ridge Commons Society* (Transition Victoria, 2013). As a destination to explore or short footpath to follow, the site contains meandering pathways, public art, a pollinator garden, Garry oak habitat, native plants, culinary herbs and food bearing plants integrated into the site design (Transition Victoria, 2013).

### 2) *Banfield Park Commons*

Banfield Commons was created in 2006, just 2 years after the Rayn or Shine community garden was established a few blocks away in Victoria West. Located in Banfield Park, the commons is a “permaculture food forest...open to the public for harvest” (Vic West Food Security Collective, n.d.). It is maintained by a group of volunteers which organized into Victoria West Community Association’s action project, the *Vic West Food Security Collective*. The garden features fruit trees, shrubs, herbs and annuals, and a decorative cob bench as part of the garden’s permaculture principle “Sustenance to All” (Victoria West Community Association, 2013).

### 3) *Wark Street Commons*

Created in 2006 by the Hillside-Quadra Gardens Group, Wark Street Commons is best described as a “...demonstration community food garden that has become a forum for learning about organic growing and harvesting” (2010). The commons is located within Wark Street Park adjacent to a playground in a quiet residential neighbourhood. Although it appears the initial momentum for the garden has waned, it is under the management of the Hillside Urban Farmers For Sustainability (HUFFS) as of 2012. The development of Wark Street Commons is featured in Figure 3, and the state of the garden as of 2013 is illustrated in a composite of photos in Figure 4.



**Figure 3:** Wark Street Commons progress photos courtesy of Jackie Robson (personal communication, May 11, 2013).



**Figure 4:** Wark Street Commons (personal photograph, May 11, 2013).

#### 4) *Fairfield Community Garden*

At the time of this study, the Fairfield Community Gardens was a work in progress and proposed as a commons garden in 2009 for the Robert J. Porter Park.

#### *Boulevard Gardens*

A modest, yet growing form of commons gardens are boulevard gardens. The City of Victoria's *Boulevard Program* defined boulevards as the "...grassy strip of land between a property and the street owned by the City", many of which have trees and are situated between the sidewalk and the curb (2009a). Boulevards often occupy utility corridors for hydro and gas lines which require year-round access for maintenance purposes (City of Victoria, 2009a). Permanent structures are therefore avoided, but temporary or interim gardens are feasible options for these spaces. At present, boulevards represent an untapped source of land for growing food, as there are over 300 kilometres of boulevard space in Victoria (2009a).



**Figure 5:** Haultain Commons (top left, bottom right) and boulevard gardens along Haultain Street (personal photograph, June 5, 2010).

#### *Haultain Commons*

Local boulevard garden enthusiasts Rainey Hopewell and Margot Johnson have created Haultain Commons, a "...neighborhood-supported public food garden on public land, where all may harvest" (Donaldson, 2010). Haultain Commons hosts a variety of plants, including strawberries, artichokes, sweat peas and rhubarb, featured in Figure 5.

Despite initial hesitation from the Parks Department due to the issues of liability and maintenance, an open dialogue garnered their approval and Haultain Commons has thrived with the support of neighbours and the greater community. It has been established for over 4 years and is now partnering with SLUGS for educational classes (Sustainable Living and Urban Gardening Skills for Youth Program, 2012). In the spring of 2012, the City of Victoria's Parks Department collaborated with the Haultain Street community in a show of support to help plant eight Carpathian walnut trees along the boulevard.

While boulevard gardening appears to be in random patches amongst residential areas throughout Victoria, a formal inventory or study has not been conducted to understand the extent to which the public is participating in boulevard gardens. Since Haultain Commons has garnered the attention of the public, the City of Victoria has also taken notice and is currently reviewing its policy concerning the planting of flowers and vegetables by the public in these marginal spaces. At present, homeowners can choose to opt out of the City's Boulevard Maintenance Program, which grants them control over the maintenance of it.

## **2.2 Urban Agriculture Policy in the City of Victoria**

The public's increased participation in urban agriculture has influenced policy and bylaw changes in the City of Victoria. In addition to the *Community Gardens Policy* and the *Boulevard Program* outlined in Section 2.1.2; an *Urban Agriculture Resolution*, *Home Occupation Bylaw*, and the *Official Community Plan* have been modified to allow and facilitate the practice of urban agriculture. Reviewing the current urban agriculture policies demonstrates the City of Victoria's support for urban agriculture, as well as the policy limitations imposed upon urban agriculture activities in Victoria. In this section I provide an overview of the City of Victoria's urban agriculture as they were discussed by participants during the interviews.

### *Community Gardens Policy*

The City of Victoria's *Community Gardens Policy* was created in 2005 in response to individuals requesting the city formalize guidelines for community garden participants to follow.



### *Urban Agriculture Resolution*

In 2007, an *Urban Agriculture Resolution* was passed to demonstrate the City's intention to support food production in the city. The core statement was summarized by the Community Council as:

The City of Victoria supports in principle the concept of urban agriculture as a valuable community resource and will work to collaborate with the community, neighbouring municipalities and Capital Region District to support and encourage Urban Agriculture where possible (n.d).

Similar to the updated *Community Gardens Policy*, the *Urban Agriculture Resolution* includes the recognition of community gardens and edible landscaping as a legitimate activity in parks. The resolution did not contain set objectives, but was meant to be a show of support for creating policy and mobilizing local urban agriculture initiatives (Community Council, n.d.).

### *Home Occupation Bylaw*

In conjunction with the need for a statement of support, came the need to amend bylaws with the rise of entrepreneurial urban agriculture in Victoria. The *Home Occupation Bylaw* was changed to accommodate: "up to two people are permitted to engage in urban agriculture as a home occupation" (City of Victoria, n.d.). Since only two individuals residing at the home are allowed to engage in cultivation, sharing the space with SPIN farmers would not allow the homeowners to claim the taxation rate. The bylaw also states that the taxation rate would remain equal that of the residential rate, denying the opportunity for farm status taxation rate (City of Victoria, n.d.). The bylaw prohibits the sale of produce at the place of residence, taking away the opportunity for farm gate sales for small producers. In 2009, bylaw enforcement approved 2 licenses for home occupation urban agriculture (Bouris et al., 2009, p. 105).

### *Official Community Plan*

The *Official Community Plan* (OCP) released in July of 2012, provides directions and policies as a framework for planning and land use management decisions at the local government level (p.13). The scope of the OCP was extended to include a new chapter on

*Food Systems*, identifying two goals for the long term sustainability of food systems in the City of Victoria as:

- (A) A healthy share of the food that supplies Victoria’s daily needs is sustainably grown, processed and packaged in the city, in surrounding agricultural areas, and on Vancouver Island.
- (B) Victorians have access to skills, knowledge and resources to produce and process their own food in urban areas (p.115).

The OCP recognized the main challenges to creating and ensuring a sustainable food system over the next 30 years is the dependency on imports, rising energy costs and influence of climate change. The OCP also acknowledged how the City of Victoria was contending with an increasing demand for access to allotment gardens, whereby demand exceeds supply due to the number of apartment dwellers in the city who lack access to land (p. 115).

The OCP’s *Food Systems* section outlines the food system policies to be addressed, with five broad objectives as the framework. In particular, the objective 17 (b) states that “...*the opportunity for urban food production is increased on private and public lands*”, offering an incentive for government and private citizens to engage in urban agriculture (p.116). The recommended action items for urban food production specifically state the City’s intent to develop policy to increase the number of allotment gardens and commons gardens. This approach included looking at the potential land types (17.4.1) and roles of participants which might support food production activities (17.4.2); encouraging the use of City-owned, public, and private land (17.4.3); and acquiring land for food production (17.4.4) (City of Victoria, 2012b, p.117). The latter of the recommendations relating to commons and allotment gardens encourages food production in “...visible and suitable public places to foster a connection between people and the process of growing, harvesting and eating fresh produce” (17.5) (2012b, p.117).

The OCP also recommends “at least one allotment garden per neighbourhood”, co-locating gardens with community facilities or services, and in neighbourhoods with a high proportion of rental or attached housing (17.7). Co-locating sites with demand, and amenities in support, presents a more desirable location for the long-term success of a

community garden. With this in mind, the policy suggested collaborating with community groups to initiate projects and provide stewardship (17.8).

In addition to the *Food Systems* chapter, the section on *Parks and Recreation* features urban food production in greenways (9.7.3), considered food systems in urban forest management (10.14.2) and promotes the household level knowledge and skill building of food systems to further the environmental stewardship and sustainability education of Parks (10.22.2). Although the policy does not explicitly state it supports allotment or commons gardens in parks, it is conducive to the use of park space for food systems activities as such.

### *Conclusion*

The City of Victoria's policies signify a progressive approach to encouraging the practice of urban agriculture in different facets of the city. However, when reviewing and comparing each policy, it appears they favour promoting community gardens rather than entrepreneurial urban agriculture. Although the *Home Occupation Bylaw* recognized urban agriculture as a home business, there were still significant limitations for urban producers on the location, scale of operation, and taxation rates. Overall, the City of Victoria's policies provided effective guidelines for groups and individuals interested in practicing urban agriculture and creating community gardens.

## **2.3 Community Gardens for Food Self-reliance and Food Security**

Many cities around the world have considered urban agriculture part of a solution to poverty, nutritional deficiencies, and a way for low-income families to obtain social and economic assistance. The majority of community gardening initiatives for food security have been undertaken in developing countries, and much of the literature focuses on Africa, South America and South-east Asia (Shackleton, et al., 2009; Mougeot, 2005; Bryld, 2003; Nugent, 2000; Food and Agriculture Organization, 2012). As stated in section 2.1.2, many community gardens were established in North America to facilitate community building and rejuvenate areas of urban decay (Iaquinta & Drescher, 2010; Fairholm, 1998 & Schmelzkopf, 1995). However, cities in North America have begun to use community gardens to contribute to greater food security of the community (Lawson, 2005). To demonstrate the contribution of community gardens as a means of increasing

food security, examples from the City of Seattle and the state of Hawaii are briefly discussed below. Both cities were chosen because of their similarities with Victoria, as Hawaii is an isolated island and Seattle has a history of demand for community gardening space, in particular from individuals with low-income.

### **Seattle's P-Patch Program's Community Gardens: Contributing to Food Security and Food Banks**

The most significant example of community gardens contributing to community food security in the USA is the P-Patch Community Gardens in Seattle, which has a long history of civic engagement and community building. Started in 1970 on a single tract of farm-land donated by the Picardo family, the P-Patch Program sprung “from the desire of neighborhoods to make connections and improve their surroundings through stewardship” (City of Seattle, 2013). The land was eventually bought by the City of Seattle in 1973, and is now overseen by the Department of Neighbourhoods' P-Patch Program. The P-Patch Program is so popular the term ‘p-patch’ is synonymous for allotment garden. At present, the program has acquired and manages 60 gardens across the city, with over 1,900 plots on 0.05 kilometres squared (12 acres) of land (City of Seattle, 2013).

In a 2007 survey of the gardeners, it was evident that the gardens are much more than a social enterprise. The scope and level of response was high, as 1,600 out of the 1,900 plot-holders responded. The gardeners were composed of 44% renters, and 77% are without space to grow vegetables, indicating access to land for growing food is an important part of participation (City of Seattle, 2013). When examining income levels, more than 75% of gardeners earned far less than median income for Seattle (\$75,600 in 2007).

In terms of production, the survey demonstrated that the “gardens are a significant source of food” since 36% of gardeners met up to 50% of their produce needs during the growing season from April to October. The productive capacity of the plots and the commitment of gardeners encouraged donations to the local food banks, resulting in a total of 9,438 kilograms (20,809 pounds) of fresh produce redistributed to the community in 2011 (2012). Such a yield is the equivalent of 41,616 servings of fresh produce with a market value of approximately \$46,404.00 (Solid Ground, 2012).

### **The State of Hawaii: An Island in Isolation**

Like the City of Victoria, the state of Hawaii grapples with an 85-90% dependency on imports, and is far less capable of sustaining the population than in the 1960s due to loss of farmland and a decline in overall production (Southichack, 2007, p.10). Situated in the centre of Pacific Ocean, Hawaii is the most geographically isolated landmass on the planet (Kohala Center, 2010).

Although food security is being addressed primarily at the state level, an Agricultural Development Plan for Hawaii recommends tax incentives for community gardens, and creating a more “robust local food system” through second level activities such as school and community gardens (Kohala Center, 2010, p.23). The encouragement to create community gardens through actions and regulations by the County will help increase food security (Kohala, 2010, p. 25).

#### **2.3.1 Food Security and Self-reliance in the City of Victoria**

Though Victoria experiences food insecurity in the form of extreme poverty and population migration, it is primarily subject to a lack of food self-reliance due to its geographic location, population growth, and a decrease in local production because of the urbanization and access to food. Since Victoria is situated on Vancouver Island, it is increasingly dependent on food imports from the mainland. Any disruption in ferry transportation would directly impact food availability on the island (CR-FAIR, 2007). The reliance on imports has led to a decline in food security because Victoria does not have the infrastructure or capacity to provide for the current food needs of the population (Found & Versteeg, 2007). For the island as a whole, only 10 % of the food is locally grown, compared to historical records where 85 % of the Vancouver Island’s food supply was produced locally before the 1960s (Bouris et al., 2009; Vancouver Island Community Research Alliance[VICRA], 2011; Haddow, 2001). These statistics have been repeatedly embedded into the local understanding and awareness of the island’s food system, as noted in the interviews, although the origin of these figures is unverified.

Along with the island’s lack of food self-reliance, individual food insecurity is increasing due to the rising cost of food and cost of living in British Columbia (or at least part of it). The cost of feeding a family of four in a month rose from \$626 in 2001 (p.6), to \$858 in 2009 (p.4), while families living on income assistance have received the same

amount of financial support since 2001 (Dieticians of Canada, 2007). The City of Victoria has the lowest median household income in the Capital Region District (City of Victoria Census Information, 2009, p.3). Victoria is expected to experience greater food insecurities in the future if the number of individuals on income assistance and the lack of locally based agricultural production are not addressed.

At present, food security initiatives in Victoria and the greater CRD include CR-FAIR, LifeCycles, Food Roots, Island Chefs Collaborative, Vancouver Island Health Authority, Local Farmers Markets, CRD Roundtable on the Environment's Food and Agriculture sub-committee (Barbulak Gauvin, & Janz, 2008). The issues of food security and food self-reliance have also been recognized and incorporated into the City of Victoria's municipal policy and planning objectives, with the latest *Official Community Plan* (2012, July), including food security as a priority to be addressed in the new chapter dedicated to Food Systems. By localizing food systems and engaging in urban food production, the City of Victoria is enabling citizens to become more food aware and food secure (p. 115).

## **2.4 Conclusion**

While urban agriculture is practiced in a multitude of forms and across the various scales, community gardens are the focus of this research and Victoria's UALI. Community gardens including allotment and commons gardens, represent an established and growing form of urban agriculture in Victoria because of the increasing demand for community garden space and support from the City of Victoria. The City of Victoria stated their support for creating community gardens through their urban agriculture policy which provides guidelines for the public and recognizes the potential for community gardens to contribute to food security.

Furthermore, cities around the world are working towards food self-reliance and food security by engaging and encouraging the community gardens. Victoria's lack of food security and food self-reliance are being addressed through food security initiatives and policy, part of which includes encouraging community gardens. This study seeks to identify barriers and supports to the creation of community gardens and evaluates the role of an UALI in identifying land suitable for community gardens.

## **Chapter 3: Literature Review of Urban Agriculture Land Inventories**

The previous chapters' profile of Victoria and the extensive literature review of urban agriculture provided the context and motivation for conducting an UALI in Victoria. Chapter 3 continues on this course by exploring the role of land inventories in planning for future land use and examining the characteristics of existing UALIs with an emphasis on the Vancouver, Portland and Nanaimo inventories. This chapter also highlights and describes the groups and individuals responsible for conducting UALIs, while exploring their diverse motivations, approaches, methodologies, and the anticipated outcomes of previous UALIs.

### **3.1 Land Inventories in the Planning Context**

Land inventories are an essential tool for municipal planners because they provide a survey of the landscape detailing land use, resources and land cover, and providing data that can be used for modeling and managing areas of interest (Lillesand & Kiefer, 1999; British Columbia Ministry of Agriculture, Food and Fisheries (BCMAFF), 2004; Quon, 1999). Land inventories can also provide a survey of land capability for a specific use or interest, functioning as a baseline for future research. However, it is important to note land inventories have historically been used to render landscapes legible and exploitable, and should be approach with caution (Li, 2010).

The Canada Land Inventory (CLI) is a key example of how successful a land inventory can be for resolving land use conflicts and informing planning decisions. The CLI is a land capability classification system identifying “productivity potential based on soil” (Dumanski et al., 2004, p. 4). It has aided in land use decisions in the settled areas of Canada during its rapid shift from a primarily rural agricultural economy to an urban-industrial-economy (Dumanski et. al, 2004; Environment Canada, 1964).

At the provincial level, British Columbia's Ministry of Agriculture, Food and Fisheries (BCMAFF) extoled the benefits of an agricultural inventory as a tool for planning through outcomes such as (BCMAFF, 2004, p.4):

- a record of land uses and act as a benchmark for monitoring land use change
- improved understanding of land use and resource relationships

- identifying impacts of proposed policies and regulations
- improved information base to assist land use decision-making including official community plan and bylaw updates
- support identifying challenges and opportunities to enhance agriculture; and
- identifying opportunities for greater land use and resource compatibility

Whether inventorying land for a provincial agriculture survey or the CLI, the advantages listed above are similar across various landscape scales.

However, in the context of local food security, fine-scale inventories at the street level are of greater benefit than large-scale city-wide level because they provide a localized, detailed account of current land use activities, and can incorporate specific social, ecological and economic characteristics of an area. In turn, the characteristics of the area, the data employed to develop the inventory, and the information obtained thereafter, can be used to render hypothetical models and visualizations of potential land use scenarios.

An emerging approach has been to use land inventories as a means of identifying opportunities to expand urban agriculture within the city's land base. Conducting an urban agriculture land inventory (UALI) creates a localized and a temporal model of the existing land use practices. UALIs are also beneficial to municipal governments because they enable the integration of urban agriculture "into planning and policymaking processes to enhance sustainability" (Mendes et. al., 2008, p. 436). The remainder of this section exemplifies how UALIs are an effective tool for planning for urban agriculture by critically examining the inventories conducted in Portland, Vancouver and Nanaimo, and providing a comparative overview of the features common to other known inventories. Nevertheless, they suffer from a lack of adequate documentation of the process of critical development and the steps undertaken in the GIS analysis.

### **3.2 Survey of Current Urban Agriculture Land Inventories**

The first major undertaking of an UALI in North America was in 2005 in the City of Portland, Oregon (Union of British Columbia Municipalities (UBCM), n.d.). Since that time, I discovered 18 UALIs have been conducted in North America, (listed in Table 3 according to the date they were created, and feature the city or area of study, the author(s) and the group or individual for which the UALI was prepared). It is important to note that



the list of inventories I compiled is not exhaustive, as unpublished reports or student papers may not have been available at the time of this study. An example of such was Cramer's graduate thesis for the Nanaimo UALI (2009) and the *King County land inventory: County owned parcels selected for community garden potential* (2009). Knowledge of their existence came by mere chance, as they are not easily obtained online without knowing the titles or authors beforehand.

Examining Table 3 in detail reveals the 19 authors' context and purpose, each with varying approaches and site analysis depending on the designers responsible and the desired outcome. The UALIs' were composed of 6 graduate students masters' thesis, 6 groups of students and/or faculty (whereby 4 were research projects spearheaded by universities and 2 were initiated by the city); 4 were completed individually by students or as a group as part of course requirements in undergraduate or graduate studies; 2 were initiated by city policy or an action item and completed by city employees, and one was commissioned by the city and created by an independent researcher.

Comparing the UALIs as a whole, 84.2% (16) were produced at or by a university, whereas only 15.8% (3) were produced by the city of study, or an independent researcher. By this standard, it may be inferred that the known UALIs were predominantly a scholarly pursuit, as they were seldom carried out by organizations beyond the institutions of academia. I believe conducting an UALI requires a significant amount of time and effort, which a city government may not be able to fund. Graduate students have the opportunity to explore new avenues of inquiry while they are fulfilling the requirements of a degree or course work. Overall, most UALIs were initiated by a university and were conducted in correspondence with city employees, while engaging in consultation with various stakeholders including the public and community garden user groups.

**Table 3:** Chronology of UALIs Conducted in North America detailing the Authors' Association, Purpose and Client.

	City	Year	Author(s) and Association	Prepared for
1	Portland, Oregon	2005	Diggable City Project Team: Nohad A. Toulan School of Urban Studies and Planning, Portland State University	Initiated by a City Council Resolution, Prepared for the City of Portland
2	Gainesville, Florida	2005	Shefali Bhattarya University of Florida	Master's thesis
3	Vancouver, British Columbia	2006	Terra Murphy Kaethler, University of British Columbia	Degree requirements Collaboration with the City of Vancouver's Social Planning Department's Food Policy Team
4	Seattle, Washington	2008	Megan Horst, University of Washington	Master's thesis Collaboration with the City of Seattle Department of Neighbourhoods
5	Cincinnati, Ohio	2009	David Mann University of Cincinnati	Master's thesis
6	Cleveland, Ohio	2009	Morgan Taggart, Meghan Chaney, Daniel Meaney Cuyahoga County Planning Commission	Initiative of the Cleveland-Cuyahoga Food Policy Coalition
7	Halifax, Nova Scotia	2009	Anita Nipen Environmental Studies Honour Thesis, Dalhousie University	Course requirement
8	King County, Seattle Washington	2009	Weston Brinkley, Ro Hohlfeld, Heide Martin, Bradley Pavlik University of Washington	Course Requirement King County Executive Office
9	Vernon, British Columbia	2009	Wendy Aasen North Okanagan Food Security Action Committee	Social Planning Council for the North Okanagan Food System Development Project with the City of Vernon Community Grants Program
10	Nanaimo, British Columbia	2009	Kelsey Cramer University of Guelph	Master's thesis
11	San Francisco, California	2010	Paula Jones San Francisco Department of Public Health	Executive order of the Mayor of San Francisco Gavin Newsome
12	Oakland, California	2009 (rev. 2010)	Nathan McClintock and Jenny Cooper University of California, Berkeley	An action item from the Mayor's Office Oakland Food System Assessment (OFSA)
13	Detroit, Michigan	2010	Kathryn Colasanti, Charlotte Litjens, Michael Hamm Michigan State University	Michigan State University's C.S. Mott Group for Sustainable Food Systems
14	Toronto, Ontario	2010	Rod MacRae, Eric Gallant, Sima Patel, Marc Michalak, Martin Bunch, Stephanie Schaffner York University	York University's Faculty of Environmental Studies
15	Philadelphia, Pennsylvania	2011	William Cooper University of Pennsylvania	Course requirement
16	New York, New York	2011	Kubi Ackerman, Project Team: Richard Plunz, Michael Conard, Ruth Katz, Sarah Brennan, Patricia Culligan, Columbia University	Columbia University's Urban Design Lab at the Earth Institute
17	Waterloo, Ontario	2012	Noah C. Shumante University of Waterloo	Master's thesis
18	Akron, Ohio	2012	Allison Oulton University of Southern California	Master's thesis
19	Chicago, Illinois	2012	John R. Taylor, Sarah Taylor Lovell University of Illinois	University of Illinois's Department of Crop Sciences

### **3.3 Characteristics of Urban Agriculture Land Inventories**

This section provides a summary of the characteristics of the different UALI, examining the range of objectives, approaches to developing site selection criteria, and the methods of site analysis.

#### **3.3.1 Objectives**

An overview of 11 UALIs by Megan Horst for the American Planning Association ascertained the objectives of most UALIs fell into two categories: identifying land for a specific type of urban agriculture or land use, and estimating the agricultural food production potential. The majority of UALIs identified sites for a range of urban agricultural practices, or focused on a specific type, with most surveying public land. For example, community gardens were a principle objective for the Vernon, Akron, Gainesville, King County, Seattle, and San Francisco UALIs.

In some instances, the objectives of identifying a specific type of land and urban agriculture were merged. For example, the Cincinnati and Akron UALIs focused on the identification of vacant land for the purpose of community gardens. Cincinnati's inventory compared vacant land with areas identified as food deserts, where overlapping areas were considered opportunities for new community gardens (Mann, 2009). The Akron inventory identified vacant land for community gardens with the intention of increasing social capital in areas with fewer hubs of civic engagement (Oulton, 2012).

A small number of UALIs estimated the production potential based on the land available and the projected consumption requirements of the population (Horst, 2011, p.1). The UALIs of Toronto, Oakland and New York estimated production potential by examining a variety of land types such as vacant, existing agricultural, public and private, schools, and sometimes rooftops. In addition, the Detroit UALI focused on identifying city-owned vacant land for urban agriculture, with the objective of identifying sites based on their agricultural production potential. Examining production potential also indicated an interest in commercial and/or more intensive production based urban agriculture to increase the amount of food produced and contribute to the city's food security.

### 3.3.2 Land Considered

An approach to conducting UALIs has been to inventory public land, vacant or open space, and brownfields, as a means of identifying sites for various levels of urban food production. Many UALIs focused specifically on inventorying publicly owned vacant land because it is often idle, underused land; lacking physical infrastructure; providing accessible, open space; and easily identified by pooling municipal land bank and tax data.

The UALIs based in Detroit, Oakland and Vernon prioritized vacant or land as their objectives. Detroit's UALI capitalized on the vast tracts of vacant land resulting from City of Detroit's de-industrialization and de-population from its economic decline (Colasanti, Litjens, & Hamm, 2010). In contrast, the Oakland based UALI discovered public vacant land was limited source of land in the city, and broadened the UALI to include "...any public land suitable that could be *potentially* used for urban agriculture" (McClintock & Cooper, 2009, p.9).

Publicly owned land was also favoured in the Vernon UALI because it had the potential for long term tenure with the local government, whereas privately owned land was less secure (Aasen, 2009). In contrast, and regardless of the existing tenure, the Philadelphia UALI employed multi-spectral analysis of vegetative cover to determine the productive capacity of all land within the city limits (Cooper, 2011, p.20).

The scope of the inventory was also reflected in the ownership and type of land considered. For instance, Vernon's approach was limited to city designated park space, whereas the most complex UALI to date in New York examined an extensive range of urban agricultural activities and land use. The activities and land use considered varied from public and private land, rooftops, NYC Housing, community gardens, green streets, and underutilized space (Ackerman, Plunz, Conard, Katz, Brennan, & Culligan, 2011).

### 3.3.3 Developing Site Selection Criteria: Stakeholders, Interviews and Public Consultation

Drawing from the UALIs in Table 3, the process of creating site selection criteria in this research project was guided by the objective of the UALIs, the groups and individuals' responsible, as well as the inherent characteristics of the city or area of interest. Understanding the influences behind creating site selection criteria was

important because it provided a rationale for the inclusion or exclusion of criteria, their order, ranking and weight, and their application in my analysis.

Although some UALIs offered very little information about the process behind developing site selection criteria, most engaged a variety of stakeholders to inform the site selection criteria. As described in the focused literature review (Section 3.2), Portland's TAC, Vancouver's Working Group and Nanaimo's specialist interviews, consulted with city departments, urban agriculture experts and the general public to inform their site selection criteria. Subsequently, Oakland's UALI applied Portland's approach and created a Community Advisory Committee with "members from UA and food systems organizations, city planners, and community members" (McClintock & Cooper, 2010, p.8).

#### City Bureaus

Collaborating with city bureaus provided access to specific GIS data and technical support, while effectively working towards fulfilling the city's policy objectives and action items. For example, Seattle's UALI was the outcome of a graduate student's consultation with the Department of Neighborhoods staff, whereupon a "list of criteria to determine the suitability of each site was established" (Horst, 2008, p.22). The Cincinnati UALI's site criteria were also guided by the Parks Department, as they consulted with the agencies managing vacant land (Mann, 2009). Cleveland and San Francisco's UALIs were also city-led initiatives which gathered input from multiple government agencies.

#### Urban Agriculture Experts and Community Members

Interviews with urban agriculture experts and community members also shaped site selection criteria. Among the first UALIs, Gainesville conducted semi-structured interviews with community gardeners and created a literature review to guide criteria design because "no criteria existed to locate suitable lands" (Bhattarya, 2005, p.37). The Detroit UALI also engaged 10 local urban agriculture leaders and professionals and hosted 5 focus groups with "residents affiliated with urban agriculture organizations or other community groups" (Colasanti, Litjens, & Hamm, 2010, p.2).

In contrast, San Francisco, Chicago, Philadelphia, and Halifax did not conduct interviews or consult with any groups beyond the immediate authors' circle. For instance,

the Halifax UALI used a simplified approach and evaluated the basic physical needs for urban agriculture, land and sun. Philadelphia's UALI also employed basic criteria to survey vegetative cover and determine arable land (Cooper, 2011). Such UALIs may not have required significant input to formulate site selection criteria because their focus was basic physical criteria. The UALIs conducting interviews and consulting with stakeholders sought to generate criteria for urban agriculture practices specific to the city of interest (Portland & Vancouver), whereas the inventories conducting an analysis without additional consultation had specific objectives relating to the study (such as Detroit's vacant land UALI). The interviews were community driven whereas the UALIs without interviews were objective driven.

#### Existing or Proposed Sites

In most UALIs, City departments and non-government organizations also assisted with refining the site selection criteria by supplying a list of parcels of land to examine, locations of existing or proposed sites, and any related GIS data. The survey of urban agriculture in Chicago was supported by an association of NGOs and public agencies known as GreenNet, which compiled a list of over 600 unchecked urban gardening sites (Taylor & Lovell, 2012, p.58). Vernon's UALI also received support from the City's Director of Parks, Recreation and Culture, providing a list of potential parks with favourable conditions for community gardens to examine (Aasen, 2009). In Akron's UALI, a list of existing community gardens was provided by a city-led initiative, the *Akron Grows* program (Oulton, 2012, p.21).

Overall, the UALIs exemplified various approaches to deriving their site selection criteria. From city departments and focus groups, to residents and urban agriculture experts, many UALIs drew from specific stakeholders to help prepare set of specific site selection criteria accurately reflecting their objectives and locality.

#### **3.3.4 Site Selection Criteria**

The site selection criteria from the UALIs represented both physical and social characteristics; with physical criteria often the first to be implemented and social influences considered afterwards. The most common attributes of the physical site selection criteria were: soil and surface quality, slope, parcel size, tree canopy and

building cover, sun exposure, zoning for agricultural use or industrial, water availability, ownership, accessibility, proximity to community gardens, watercourses and roads, and designated sensitive ecosystems or riparian zones. Further descriptions of the most common physical characteristics are featured in Table 4.

**Table 4:** Common physical and social site selection criteria from 19 UALIs surveyed.

<b>Criteria</b>	<b>Description</b>
<b>Soil</b>	Soil type, drainage, and potential for contamination.
<b>Surface Quality Or Ground Cover</b>	Impervious (Balmer et al., 2005) and permeable surfaces (Shumante, 2012). Oakland analysed four ground cover categories (McClintock, & Cooper, 2012, p. 52): 1) soil or grass 2) mixed surface (>25% hard surface, at least 46.5 sq. m. open soil/grass) 3) hard surface (>25% hard surface, less than 46.5 sq. m. open soil/grass) 4) dense vegetation
<b>Slope</b>	Limits of 10% (Portland), 30% (Oakland), or 40% (San Francisco) were used depending on the type of urban agriculture and size of the area analysed (Balmer et al., 2005, p. 95; McClintock, & Cooper, 2012, p.53, & Jones, 2010, p.47). Portland considered less than 4% slope a suitable level grade (Balmer et al., 2005). Some UALIs generally considered slope, such as Toronto’s “non-obvious slopes (from orthophotos) that might limit production” (MacRae, Gallant, Patel, Michalak, Bunch, & Schaffner, 2010, p.12).
<b>Size</b>	Size classifications were applied according to potential use (See Table 7 of Portland and Vancouver size classes). Ranges from no less than ¼ acre in Cleveland (Taggart, Chaney & Meany, 2010, p.10) or 2,000 sq. ft. in King County UALI (Brinkley, Hohlfeld, Martin, & Pavlik, 2009, p. 4). Size was also considered according to the number of community gardens possible or the current land use, such as a minimum 10 allotment gardens in Vernon (Aasen, 2009, p.3) and excluding parcels smaller than 600 m <sup>2</sup> in Nanaimo, unless the parcels were vacant, in which case they could not be less than 300 m <sup>2</sup> (Cramer, 2009, p.74).
<b>Sun Exposure or Shade</b>	A minimum of 6 hours sun exposure (Aasen, 2009, p.3; & Jones, 2010, p. 47), up to 8 hours (Oulton, 2012, p. 16). Factors influencing sunlight such as tree canopy cover and building coverage were also considered.
<b>Zoning</b>	Most inventories considered the existing zoning of land designated for agricultural use versus industrial.

**Table 4:** Common physical and social site selection criteria from 19 UALIs surveyed – *Continued.*

<b>Water access</b>	Water main available on site, irrigation or potential for on-site water collection and storage.
<b>Ownership</b>	Public or government ownership (municipal, provincial, or federal), institutional (church, school, hospital), or private (business or residential).
<b>Ecologically Sensitive Areas or Riparian Zones</b>	Ecologically sensitive areas were excluded (Nanaimo, San Francisco) or a buffer distance was imposed around these areas. Toronto’s UALI imposed a 5 m buffer from the “bankfull width of all streams” in the study area (MacRae et al., 2010, p.12), while Portland excluded sites located in the area of a 100 year floodplain or conflicting with wetlands (Balmer et al., 2005).
<b>Social Criteria</b>	<p>Criteria included: access to transit; population density; proximity to schools, low income or elderly populations; the interest, support and security of a site; as well as the future land use (Cleveland) and local development plans (Seattle).</p> <p>As a future consideration, Seattle’s UALI recommended examining local population characteristics such as average median income, the percentage of rental housing and minorities, and the concentrated growth areas identified in Seattle’s Comprehensive Plan (Horst, 2008, p.26).</p> <p>Portland considered sites within 400 m of a bus stop and 800 m of bike networks, and pedestrian access to a sidewalk within 3, 9, or 15 m (Balmer et al., 2005, p.97). To specifically identify sites for community gardens, the Portland inventory included qualitative criteria such as: a demonstration of neighbourhood need or support, parking, ownership or land use agreement, security of the site, fencing, water access, soil quality, light, and resources for start-up.</p>



### 3.3.5 Ranking Criteria

As observed in the Portland UALI, some inventories ranked the suitability of sites based on the presence of desired characteristics or attributes, and assigned a numerical value to measure their suitability. A systemic hierarchy for classifying attributes could generate different site selection scenarios by prioritizing specific traits above others. The Gainesville UALI created a suitability score for seven secondary criteria, focusing on social attributes (Bhattarya, 2005, p.95):

- A: Nearness to Bike paths
- B: Nearness to Bus Routes (5 minutes)
- C: Nearness to Bus Routes (10 minutes)
- D: Environmentally Healthy Sites
- E: Demographics: Low-income
- F: Demographics: Elderly
- G: Existing Policies

If a criterion listed above was satisfied, it was given a single point. The total number of points indicated the suitability of the site, and was then assigned a new ranking from 1 (maximum criteria satisfied) to 6 (no criterion satisfied) (Bhattarya, 2005, p.70).

In contrast to Gainesville, Akron's UALI provided a more comprehensive analysis, weighing multiple physical and social characteristics and evaluating the combined rank to determine overall site suitability (Oulton, 2012, p.14). Each characteristic had up to 5 sub-class ranges, with 5 representing the most important and 1 representing the least. Examples of the social characteristics considered are featured in Table 5, which illustrates how census data were used to examine "...low social capital in correlation with economic depression" (Oulton, 2012, p.17).

**Table 5:** Census data to rank social capital from the Akron UALI (Oulton, 2012, p.17).

	<b>Avg. Unemployment Rate</b>	<b>Avg. Income</b>	<b>Population Range</b>
<b>Parcel Number</b>	<b>5</b> = 22.8 - 100%	<b>5</b> = \$0 - \$27,000	<b>5</b> = 6000+
	<b>4</b> = 15.4 - 22.7%	<b>4</b> = \$27,001 - \$41,000	<b>4</b> = 5000-5999
	<b>3</b> = 8.0 - 15.3%	<b>3</b> = \$41,001 - \$70,000	<b>3</b> = 4000-4999
	<b>2</b> = 4.1 - 7.9%	<b>2</b> = \$70,001 - \$84,000	<b>2</b> = 3000-3999
	<b>1</b> = 0 - 4.0%	<b>1</b> = \$84,001 - \$375,000	<b>1</b> = <3000

In addition, the Waterloo UALI utilized a multi-criteria decision analysis (MCDA), to rank sites from 1-9 based on the parcel and land use, as well as the location (Shumante, 2012, p.157). Each characteristic was given a ranking between 1 and 5, and weighted according to their significance. For example school land was worth '5' while vacant land was only worth '1' (Shumante, 2012, p. 158). Unexpectedly, vacant land was not highly valued in Waterloo's UALI because of the increasing demand for commercial, residential and industrial land use (Shumante, 2012, p.159).

Of the few UALIs utilizing a ranking system to highlight desirable traits, not a single approach was repeated in subsequent studies. Each inventory created a unique classification system to identify sites specific to their city or area of interest, and did not draw upon the methods used in previous UALIs. Creating a ranking system specific to a city or area was beneficial because it emphasized local characteristics and had the potential to act as a benchmark for illustrating change over time if the same approach was repeated.

### **3.3.6 Analysing the Land**

After considering what land would be assessed and establishing site selection criteria, the final step in the UALI is to analyse the landscape to identify sites. Many of the inventories use GIS, aerial photos, orthophotos, and site visits to analyse a site's suitability.

Conducting a land inventory using GIS allowed for greater visual comprehension and analysis of spatial attributes because it provides a "...method of storing, managing, analysing and displaying information concerning processes and properties related to geographical location" (Yule, Cain, Evans, & Venus, 1996, p.151). GIS also helps to recognize the land's potential and improve land management decisions (Yule, et al., 1996, p.160; Nizeyimana, Petersen, & Looijen, 2002, p.229). For UALIs, GIS is an effective tool for eliminating unsuitable sites and highlighting sites corresponding with the criteria. Most inventories employ basic spatial analysis through ArcGIS or a city-composed online database, such as Vancouver's *VanMap* or the CRD's *Regional Community Atlas*. In the cases of the Gainesville and Nanaimo's UALIs, GIS was an effective platform for overlaying layers, creating buffers and conducting a sieve analysis to reduce the number of sites for further analysis. Cincinnati's UALI also used GIS

software to upload US Census data to identify the location of food deserts. The resulting map of food deserts was then superimposed with the location of vacant parcels to determine potential sites for urban agriculture in the areas of overlap (Mann, 2009, p.48).

### *Satellite Imagery and GIS*

In combination with GIS analysis, the high-resolution satellite images found in aerial photos were used to generate data, examine specific sites and areas in greater detail, and provide an effective means of classifying land cover. Chicago's UALI utilized Google Earth to access and analyse the most up-to-date aerial photos of the city's landscape. To prepare for analysis, Chicago's UALI reviewed the accuracy of extracting surface data from remotely sensed satellite imagery in land inventories of Hanoi, Vietnam and Lisbon, Portugal (Taylor & Lovell, 2012, p.59). Examining the Hanoi UALI found that the extraction of urban agriculture was "complicated by the fact that the class is very heterogeneous, comprised of a mosaic of small parcels having: i) the same crops in different stages, ii) different crops, and iii) fallow or recently farmed parcels" (Freire, Santos, & Tenedorip, 2009). Because of such challenges, the Chicago UALI turned to Google Earth as a means of analysing ortho-rectified imagery with a higher spatial resolution and a simplified platform for users with no background experience in GIS (Taylor and Lovell, 2012, p.59). In turn, the Chicago UALI used manual image interpretation to enhance the precision of interpreting high resolution aerial images in Google Earth.

To achieve this, a list of sites provided by GreenNet was uploaded into a KML (Keyhole Markup Language) file and provided a way to enter the location and attributes of features, such as place marks and polygons, as a tag based structure to display geographic information (ESRI, 2012). The sites were then confirmed using Google Earth's high resolution imagery and classified according to potential production and scale. At a resolution of 1:300, 10km<sup>2</sup> sections were analysed using tools from Google Earth, with borders drawn along computer screen sized polygons and digitized as points (Taylor & Lovell, 2012, p.60). The points identified were imported into ArcMap 10 to calculate the area (Taylor & Lovell, 2012, p.61). Although the approach appeared to be

more effective than reviewing remotely sensed images, it required approximately 400 hours of part-time work over eight months (Taylor & Lovell, 2012, p.60).

#### *Quality and Availability of GIS Data*

A successful GIS analysis is heavily dependent upon the availability and quality of spatial data. Many the UALIs acquired digital data from public online databases, as well as the city of interest, regional and government databases. However, unless the designers of the UALI were gathering the original source data to compose the spatial reference data for GIS layers, they were dependent upon the existing datasets to provide the latest, most accurate and comprehensive information available. As a result, most inventories acknowledged the limitations of the existing datasets and have appealed for further research into updating and obtaining more detailed spatial data. An example of such was the time lapse “...between data-entry and on-the-ground development...”, where aerial photos from 2006 were inconsistent with the existing conditions of the Nanaimo inventory conducted in 2009 (Cramer, 2009, p.108).

#### *Site Visits*

To confirm the accuracy of the aerial photo representations, site visits were conducted by numerous inventories. Site visits were appropriate for small scale inventories such as Vernon’s, while conducting site visits for New York’s extensive UALI would require significant time and labour to conduct. Overall, site visits provided valuable information which GIS could not always guarantee, and functioned as “ground truthing” to authenticate the existing map data and verify the state of the sites.

### **3.4 Review of Portland, Vancouver, and Nanaimo UALIs**

My approach to composing Victoria’s UALI was primarily based on analysing UALIs conducted in three cities of the Pacific Northwest region of North America: Portland, Vancouver and Nanaimo. The rationale for selecting Portland and Vancouver’s UALIs was that they were the most successful and principal inventories from which subsequent UALIs have extensively drawn upon, and because their geographic proximity to Victoria provided a degree of correlation between their site selection criteria and the characteristics desirable for sites in Victoria. The Nanaimo UALI was selected because it

contained a more detailed methodology and the city of Nanaimo has the second largest urban centre on Vancouver Island, affording it a direct comparison to Victoria (Economic Development Office of Nanaimo, 2010).

Before examining each of the UALIs in depth, it is important to consider the population size and land area of each city in Table 6. In contrast to the other three cities, Victoria had the smallest land base, a mere 20 km<sup>2</sup>, and 6% of Portland and 17% of Vancouver's land base, with approximately 1/7 of their population. The lack of land makes Victoria the second most densely populated of the four cities, surpassed only by Vancouver. The larger area of the other cities was also evident in the wide-ranging urban agriculture activities sought after in each inventory. Although the focus of Victoria's UALI was allotment and commons gardens, it was important to acknowledge the other types of urban agriculture previous studies have surveyed.

**Table 6:** Comparison of Portland, Vancouver, and Nanaimo's Population, Land Area and Density with the City of Victoria (City of Portland, 2014; Statistics Canada, 2012b; Statistics Canada, 2012a; Statistics Canada, 2012c).

City	Population (year surveyed)	Land Area (km <sup>2</sup> )	Density (people/km <sup>2</sup> )
Portland	570,929 (2009)	346.4	1648.2
Vancouver	603,502 (2011)	114.9	5,252.3
Nanaimo	83,810 (2011)	91.3	918
Victoria	80,017 (2011)	19.5	4103.4

### 3.4.1 Portland

The City of Portland's *The Diggable City: Making Urban Agriculture a Planning Priority* is widely recognized as the first major urban agriculture land inventory to be conducted in North America (Horst, 2011; UBCM, n.d). Commenced in 2005, it was a result of the City of Portland's Council's Resolution #36272, directing various City bureaus to conduct an inventory of their properties to determine if there was land suitable for "expanding the Community Gardens Program or for future development into other kinds of agricultural uses" (Balmer et al., 2005, p.11). The land surveyed was from the City of Portland's Bureaus of Environmental Services, Parks and Recreation, Water and Transportation (p.21) which had "no immediate management plans" (Balmer et al., 2005, p.17). The UALI was then undertaken by graduate students at the Nohad A. Toulan School of Urban Planning at Portland State University, with direction and support from Brendan Finn and Commissioner Saltzman's office (Balmer et al., 2005, p.17).

A Technical Advisory Committee (TAC) composed of urban agriculture experts was assembled to develop site selection criteria for classifying the City bureau's GIS property data (Balmer et al, 2005). The TAC consisted of City staff, Food Policy Council representatives, and community members (Balmer et al., 2005). Interviews, focus groups and surveys were conducted among the committee members to inform the development of site selection criteria (Balmer et al., 2005). Suitable sites were identified primarily by size, dividing parcels into small scale and large scale agriculture, and secondarily examining their suitability for community gardens or agriculture based on the presence of impervious surfaces or poor soil (Balmer et al., 2005). The potential for urban agriculture land use within each of the four classes is presented in conjunction with the size classes of the Vancouver UALI in Table 7 of Section 3.4.2.

A GIS analysis of bureau lands was used to identify agricultural land and to eliminate areas located in Environmental Zones or Parks Bureau land, and parcels less than an area of 93 m<sup>2</sup> in size (Balmer et al, 2005, p.89). The remaining parcels were assessed using a resolution of one-foot aerial photos to examine tree canopy cover, the presence of a building or parking, to obtain a visual impression of the type of urban agriculture suitable to the site and establish a personal ranking of the site's overall potential (Balmer et al, 2005). The classification of tree canopy cover is illustrated in Figure 6, visually ranking coverage into four classes, from 0-25%, 26-50%, 50-75% and 76-100% (Balmer et al, 2005, p.92).


**Figure 6:** Tree canopy cover analysis from the Diggable City's site analysis (Balmer et al., 2005, p.92).



This ranking system effectively determines the sunlight and open space available at each site, by standardizing the process of analysing aerial photos to minimize user error. While open canopy and space is the objective, this approach assumes the vegetation present has no food production potential, such as fruit trees or shrubs. Site visits would remedy this discrepancy. Furthermore, many of the attributes considered in Portland’s methodology were adopted for the Victoria UALI and are featured in Table B1 of the Appendix.

Following an air photo analysis of the parcels, the GIS analysis was conducted and considered many of the physical and social characteristics featured in Table 4 of Section 3.3.4. Portland’s UALI surveyed 875 individual parcels of City bureau land, resulting in a total of 289 locations with 430 individual tax parcels identified. Their suitability was examined further using a ‘Personal Ranking’ for analysis and a Site Visit Form (Figure A2). The rankings were from 1-3, with ‘1’ representing the lowest with obvious visual obstacles such as a building, to ‘3’ which was a considered a “good candidate” (Balmer et al., 2005, p.93). Overall, 24 sites were visited for ground truthing with 5 featured in the final report (p.98). Figure 7 provides an example of a featured site, with a “site snapshot” containing a map, site photo, and description of the site’s characteristics.


## SITE SNAPSHOT



**Potential Uses:**  
This site presents an excellent opportunity to simultaneously showcase agricultural production and environmental restoration. R10 zoning allows agriculture as a conditional use. Given the nature of the site, it would be most effectively managed by a dedicated group that worked in tandem with the City to showcase innovative land management techniques such as rainwater harvesting as well as promoting urban food production.

Agency	PARKS
Acres	4.75
District	SE
Zoning	R10
Bus Route(s)	17 Holgate
Surrounding Uses	Residential, open space
Access	Bus and bike accessible, pedestrian friendly, parking

**Existing Conditions:**  
A large site of about 4.75 acres, 4.3 of which are pervious. It has tall grass and a few trees and a fence dividing the east and west sides of the site. There is a bus stop within 1/4 mile, but the nearest sidewalk is 50 feet away, and there is some parking on one side of the site. There is a water main within 100 feet of the site and solar access is good.



**Figure 7:** Site Snapshot from the Diggable City UALI (Balmer et al., 2005, p.35).

Portland's initial UALI conducted in 2005 is now considered Phase I of III, whereby Phase II implements recommendations from Phase I's UALI in the fall of 2006, and Phase III consists of a report on the progress of the three pilot projects, including lessons learned and recommendations for future urban agriculture initiatives (City of Portland, p.2). Each report can be easily accessed online through the City of Portland's Bureau of Planning and Sustainability, allowing the general public and urban planners to review the process behind Portland's UALI. Overall, Portland's *Diggable City* provided a comprehensive overview of the steps taken to create an UALI, including a detailed GIS methodology used to analyse sites.

### **3.4.2 Vancouver**

Following Portland's UALI was Vancouver's public land inventory, *Growing Space: The Potential for Urban Agriculture in Vancouver*, conducted in 2006 by Terra Kaethler from the School of Community and Regional Planning at the University of British Columbia. The inspiration for conducting Vancouver's UALI was to contribute to the city's urban agriculture strategy outlined in the Vancouver City Council's Food Action Plan by "...document[ing] existing activities and supportive policies of urban agriculture, as well as identify[ing] suitable new sites and other potential opportunities to expand urban agriculture initiatives" (Kaethler, 2006, p.8). Following this directive, the inventory sought to identify city-owned public land for community garden and other types of urban agriculture, focusing on vacant or under-utilized spaces (Kaethler, 2006).

Similar to Portland's bureaus, the inventory commenced with data provided by the City of Vancouver's Department of Engineering Services and the federal Department of Public Works. For *Growing Space*, the addresses of available sites were compiled into a database to be analysed using aerial photos from the City of Vancouver's web-based GIS mapping system, *VanMap*. Unlike Portland's UALI, potential sites were not removed during analysis, but assigned the information obtained for future reference and analysis (Kaethler, 2006).

Potential sites were evaluated using site selection criteria and attributes, whereby criteria were developed with the City of Vancouver's Social Planning Department and a Working Group composed of City staff, Food Policy Council representatives, stakeholders and community members (Kaethler, 2006). The attributes used for site



selection were: surface coverage (open space), access, potential agricultural use, and a suitability rank (1-5) from a visual assessment of the site (Kaethler, 2006).

Kaethler and the working group also categorized site selection criteria into three classes (2006, p.61):

- **Physical criteria:** Tree canopy/sunlight, % impervious surface, proximity of adjacent buildings, presence of contaminated soil, proximity to other urban agriculture activity, visual impression
- **Social criteria:** Access to parking and/or transit, bikeway proximity, safety, opportunities for community capacity building, proximity to density or potential users
- **Land use criteria:** Block ends, right of way, traffic circles, edges and corridors, institutional or industrial lands, roof tops on public buildings, City, Crown and Provincial ownership of land.

In terms of size classifications, Kaethler's UALI contained a detailed chart listing various site areas and the types of urban agriculture suitable to each size class. Kaethler used Portland's model of categorizing sites according to the size and type of agriculture possible, applying the same Portland's size ranges for all but the community gardens size class to the Vancouver UALI. Kaethler's rationale for this was that Portland's community gardens class was too "narrow in scope". Consequently, she recalculated the range based on existing community gardens in Vancouver (2006, p.63). Portland's four classes and their associated characteristics are featured in Table 7, along with Kaethler's resulting size classifications.

**Table 7:** Size classification of suitable sites according to the Portland and Vancouver UALIs (Kaethler, 2006; Balmer et al., 2005).

Category (Portland)	Primary Parcel Category		Subset Category	
	Large Scale Growing Operations	Small Scale Growing Operations	Community Gardens	Growing on Impervious Surfaces or Poor Soil
Size (Vancouver)	1000 sq. m. + (0.1 hectare)	92 - 1000 sq.m. (0.009-0.1 hectare)	150-14,000 sq.m. (0.015-1.4 hectare)	465 sq.m. + (0.045 hectare)
Use (Portland and Vancouver)	CSAs, urban farms, community orchards, animal husbandry, horticulture, nursery, beekeeping	Farm stands, educational gardening programs, composting, vermiculture, food bank gardening, herb growing, beekeeping, market gardens, edible landscaping, fruit trees	Gardens with individual or communal plots, gardens with shared space and resources	Vertical gardening, indoor growing (sprouts, mushrooms, aquaculture, vermiculture), greenhouses, farm stands, processing facilities, farmers markets, container gardening, hydroponics

Using the site selection criteria developed by the Working Group, a GIS analysis was completed by the City of Vancouver. Sites were then further analysed using aerial photos from VanMap and a suitability ranking from 1-5 based on a visual assessment of the site (Kaethler, 2006, p.60). In contrast with Portland's comprehensive GIS methodology, the process used to analyse photos in Vancouver was not outlined in the final report, as Kaethler was not responsible for that component of the inventory. Meanwhile each site contained a suitability ranking similar to Portland's Personal Ranking based on a visual assessment of the site. A total of 77 sites were identified, in which 5 were thoroughly examined as 'Pilot Sites' with the existing and potential land use presented.

In 2008, a collaborative reflection was published by the authors of the Portland and Vancouver inventories. This document examined if their UALIs had influenced the integration of urban agriculture into planning and policy making. The resulting paper, *Using Land Inventories to Plan for Urban Agriculture: Experiences from Portland and Vancouver*, concluded that the integration of urban agriculture into city planning was achieved. More importantly, the paper has contributed to the growing awareness of UALIs as a tool for researching and planning for urban agriculture (Mendes et. al, 2008).

An important lesson from the comparative study was to recognize the importance of "engaging with community partners in the entire process from design to implementation" (Mendes et. al, 2008, p.447), such as community gardening members and staff, planners, and city bureaus. This was considered during the interviews design in Chapter 4.

Another recommendation from the study included the use of land inventories to increase institutional and political awareness and support for urban agriculture (Mendes et. al, 2008). Following their example, the results of the Victoria UALI will be shared with urban agriculture advocates amongst city staff and community members, and eventually shared with the public to increase the dialogue and surrounding allotting land to urban agriculture in Victoria.

### 3.4.3 Nanaimo

The UALI conducted in Nanaimo was undertaken in 2009 by Kelsey Anne Cramer as part of the degree requirements for a Masters' thesis in Landscape Architecture at the University of Guelph. The Nanaimo UALI was entitled *Urban Agriculture and Greenspace in the City of Nanaimo, British Columbia*, and it focused on identifying sites for urban agriculture to improve the City of Nanaimo's green space connectivity (Cramer, 2009, p.4). The Nanaimo UALI's methods were primarily based on the Portland and Vancouver UALIs, but also drew from an inventory conducted in Gainesville, Florida in 2005, as it was the "first and simplest study", and similarly a Masters' thesis (Cramer, 2009, p.47).

Applying an approach outlined in the Gainesville thesis, Cramer conducted a focused literature review examining existing inventories before interviewing three key informants representing the social, city planning, and commercial perspectives, to formulate site selection criteria (2009, p.62 ). Cramer's study also identified and mapped existing green spaces, areas of ecological sensitivity and urban agriculture within the City of Nanaimo as a basis for further spatial analysis. The final site selection criteria were classified as primary criteria and secondary criteria, with the primary criteria representing a coarse, city-wide scale, and the secondary criteria focusing on a finer scale evaluation of two planning areas (Cramer, 2009). Primary criteria surveyed physical aspects of the land and land use, such as zoning, slope, not including protected green space and area (Cramer, 2009).

The secondary criteria distinguished "...economically-oriented gardens from socially oriented gardens..." and emphasized examining the accessibility of a site by evaluating parcels within 400 m of multi-family residential housing and bus stops, and within 5 m of a sidewalk. Green space connectivity was also considered by measuring the distance to city parks and green space, as well as sites located 400 m outside of existing parks to improve connectivity (Cramer, 2009, p.74).

A site suitability analysis utilized GIS for the primary and secondary criteria, as well as airphoto interpretation and site visits to identify suitable sites. Similar to the Portland and Vancouver UALIs, most of the GIS data was provided by the City of Nanaimo's Planning and Engineering Departments (Cramer, 2009, p.43-44). Land

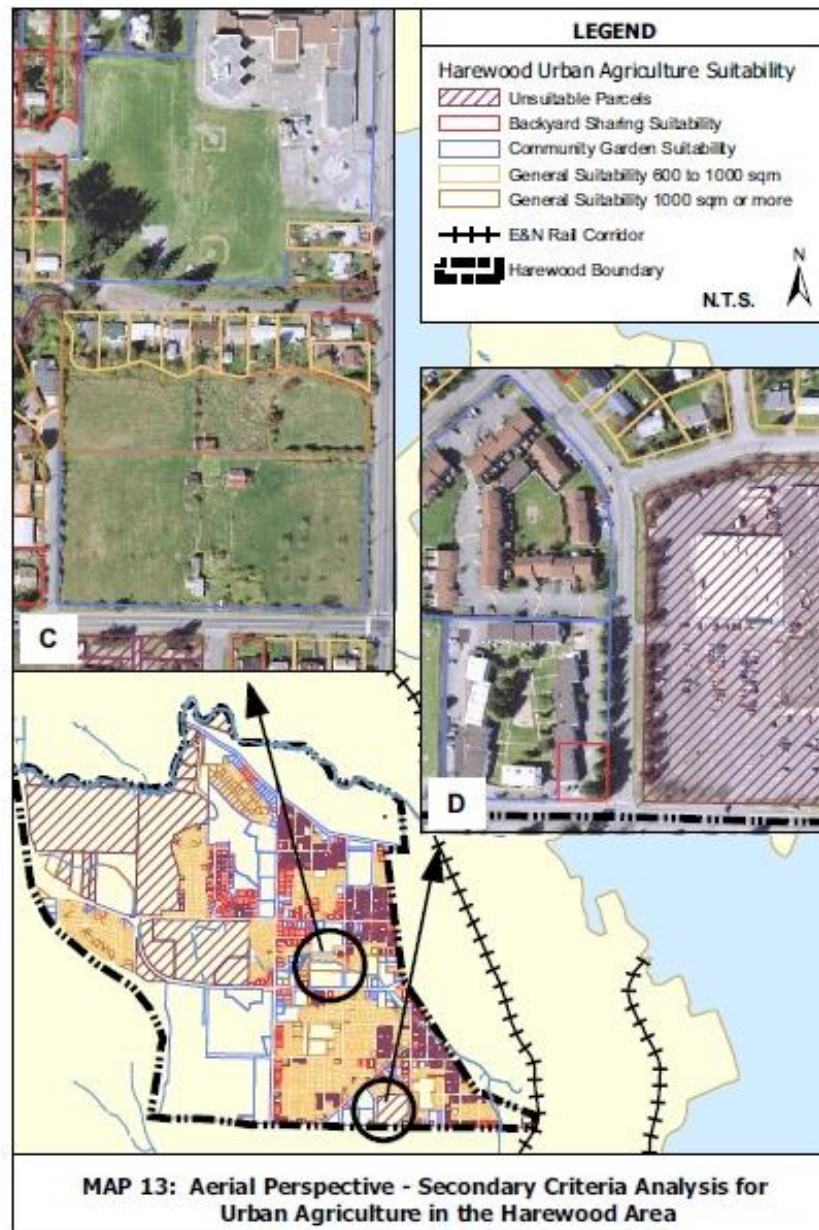
identified as green space, areas of ecological sensitivity and urban agriculture within the City of Nanaimo were mapped as a basis for further spatial analysis.

To analyse the GIS data, Cramer followed the Gainesville UALI and applied Lyle's technique of sieve mapping to "...eliminate areas not suitable for locating UA in the City of Nanaimo" (Cramer, 2009, p.41). The sieve functions as a filter, removing unwanted elements, in this case areas with difficulties or negative attributes illustrated on a map. Following this technique, all properties in the Nanaimo UALI were filtered sequentially, "...through the sieves one at a time", against the maps with unsuitable attributes until only sites with appropriate characteristics remained (Lyle, 1985, p.244).

The overlay technique was also recognized as being "...vital for comparisons of land capabilities..." allowing cartographers to "...lay one map coverage directly on top of another..." and produce a third map merging the characteristics of the two outputs (Foresman, 1998, p.30). The use of overlay and sieve mapping provided a simple and effective approach to narrowing down sites from the coarse landscape scale. For example, Nanaimo's UALI removed areas with protected green space as part of the primary criteria for site selection.

After conducting the site suitability analysis with the primary and secondary criteria, aerial photos were consulted to further examine the sites located within the two secondary criteria planning areas. A detail of areas examined in the Harewood planning area are illustrated in Figure 8.

Though the Nanaimo inventory did not engage with as many stakeholders as Portland's TAC or Vancouver's Working Group, it selected specific stakeholders and employed a detailed interview methodology, presenting criteria for evaluation. As a result, the interview design for Victoria was based on Nanaimo's model. The Nanaimo UALI employed a detailed land suitability analysis using GIS, an approach also used in my study. Overall, the combination of locality, the comprehensive approach and scope the Nanaimo's UALI made it an appropriate model to draw from and build upon for the Victoria UALI.



**Figure 8:** Detail of the Harewood Area Secondary Criteria Analysis from Nanaimo's UALI (Cramer, 2009, p.91).

### 3.5 Conclusion

This chapter served to illustrate how a growing number of cities in North America have conducted land inventories to plan for urban agriculture, with many drawing their methods from the initial Portland and Vancouver UALIs. For this research, the Portland and Vancouver UALIs provided the initial inspiration and methodological foundation for conducting an UALI in Victoria. In particular, the Vancouver UALI provided an UALI in the context of a Canadian city. The Vancouver UALI also provided a point of comparison

with Portland's UALI because it utilized Portland's methods and exhibited similar approaches, site selection criteria and assessment techniques. However Portland's UALI provided a more comprehensive assessment and greater scope, and as a result, Portland's UALI was chosen as the primary model for creating Victoria's UALI. In addition to the using the methods applied in the Portland and Vancouver UALIs, an UALI conducted in Nanaimo UALI was consulted because it utilized interviews to develop site selection criteria and contained a more detailed methodology.

Though the Portland, Vancouver and Nanaimo UALIs were the primary source of inspiration for the development of the Victoria UALI, a survey of the 19 UALIs discovered at the time of the study helped to understand the various steps taken to complete an UALI and contributed to fully developing this methodology. The survey of 19 UALIs also provided an overview of the different characteristics, their unique experiences and offered alternative approaches which could be applied at various points during the undertaking of Victoria's UALI.

In terms of authorship, the majority of UALIs were pursued by universities, with a few produced by the city of study or an independent researcher. Most inventories also engaged in consultation with different interest groups, such as the general public, community gardens users or city employees to inform the inventory.

Examining the characteristics of UALIs included reviewing the objectives, land considered, development of site selection criteria, ranking attributes and the land analysis. The UALIs' primary objectives were to identify a specific land type and use, or estimate the land's production potential. The land considered was often publically owned, with vacant land favoured because of the opportunity for accessible open space. While the different types of site selection criteria were numerous, physical criteria were implemented first to eliminate unsuitable spaces with the social characteristics of the remaining sites considered last.

For the analysis of site selection criteria, UALIs ranked criteria and utilized land analysis such as GIS, aerial photos, orthophotos, and site visits to analyse a site's suitability. Ranking criteria allowed desirable site characteristics to be prioritized using a suitability ranking or a multi-criteria decision analysis (MCDA), and was best applied to

social characteristics. For the physical land analysis, GIS allowed for unsuitable spaces to be removed, while aerial photos and site visits confirmed the results of the GIS analysis.

Though the UALIs reviewed in this chapter offered unique approaches and methods, they lacked substantial documentation of the process of criteria development and the steps undertaken in the GIS analysis. In the absence of a formal decision making process, this study endeavored to provide readers with a comprehensive methodology and elucidate each step in the development of Victoria's UALI, starting with this survey of existing UALIs. Subsequently, Chapter 4 extensively documents the creation of proposed criteria and the rationale behind each interview question, with Chapter 5 providing a thorough analysis of the interviews and the steps taken to establish the Victoria UALI site selection criteria.

## Chapter 4: Interview Design

This chapter provides a detailed methodology of the steps involved in composing and conducting the semi-structured interviews for this study. It chronicles how the interview groups and participants were selected. In addition, it describes the theoretical basis of the questions as a whole, while delving into the investigative intent of each individual question. This chapter concludes with an overview of the interview process, and the approaches used for interview analysis and the identification and prioritization of site selection criteria.

### 4.1 Methods

The qualitative research undertaken in this study was considered an ethnographic inquiry because it engaged and interpreted the experiences of a culture of individuals involved with urban agriculture (Graham, 2005, p.39). The interviews with 12 participants were small, exploratory and semi-structured, allowing for a range of questions and responses towards developing site criteria and investigating the greater processes involved with allotting land to community gardens and urban agriculture in the City of Victoria, specifically focusing on the barriers and supports. The interview questions were also used as themes to guide the research, and contribute towards developing and answering the two main research questions:

- 1) *What selection criteria can be applied to determine suitable sites for community gardens in the City of Victoria?*
- 2) *What underlying barriers or supports are there for allotting land to urban agriculture in the City of Victoria?*

The interviews involved using direct questions to focus the discussion and analyse site selection criteria, as well as open-ended questions to feature the individual's knowledge and experience of urban agriculture and community gardens (Kvale, 2007, p.61). Probes were used to help guide the interviewee to disclose more information or to further explain a particular point. Based upon their structure, the interviews were considered systematizing expert interviews, where the researcher sought specific information from experts using an "elaborate topic guide" - in this case, the proposed site selection criteria (Littig, 2009, p.47).



I considered using a standardized questionnaire with a set of criteria for interviewees to rank criteria, but dismissed the idea because of the concerns that it would prove limiting to criteria development by assuming the criteria presented were the most accurate to apply. Engaging with interviewees in discussion provided the opportunity to discover the rationale behind their responses. A questionnaire would result in the loss of such a rich discourse, and potentially overwhelm participants with the amount criteria presented.

A mixed methods approach was also used to introduce data from other sources into the study, in this case a digital map of Victoria was available to examine existing gardens, recommend new sites and stimulate discussion. This allowed for the triangulation of data after the interviews were completed.

#### 4.2 Purposeful Sampling of Specific Groups

This section details the process of determining groups to interview, the resulting participants and the interview process. The researchers undertaking the Portland, Vancouver and Nanaimo's UALIs consulted with advisory groups or interviewed key informants to identify and refine site selection criteria (4.4.3). Following this model, three specific groups of individuals directly or indirectly involved with urban agriculture and community gardens in the City of Victoria were identified and selected for one-on-one interviews. The objective of the interviews was to gather insight from local experts and specialists and to engage with different perspectives and experiences with urban agriculture. The interviews were also used to inform the site selection criteria by questioning what criteria would identify land suitable for community gardens in Victoria. The three interview groups are listed in Table 8.

**Table 8:** Description of Interview Groups.

Group	Description	Sample size
<b>Group 1: City Planners</b>	City of Victoria planners involved with planning for community gardens, urban agriculture and GIS.	4
<b>Group 2: Community Leaders</b>	Educators, non-profit, community groups engaged in enabling, facilitating or regulating urban food production.	6
<b>Group 3: Urban Producers</b>	Individuals engaged in food production within the City of Victoria.	2

The participants selected were considered ‘elites’ because of their specialization, unique influence, and their knowledge “about a particular area of research or about the context within which you are researching” (Graham, 2005, p.54). While some participants were in a position of power associated with an ‘elite’ interviewee, such as the decision making power of working for neighbourhood association, each participant was selected due to their community based knowledge, active engagement in urban agriculture in the City of Victoria, and potential contributions important to this study (Littig, 2009).

A profile and grounded understanding of each participant’s involvement with urban agriculture was ascertained to verify their qualifications as an expert interviewee and potential knowledge contributions. Individuals chosen to participate in the interviews had a personal history of engagement in urban agriculture at the community or professional level in Victoria. Furthermore individuals acting as community leaders, urban agriculture activists, or participating of the decision making process for allotting land were specifically sought out. Understanding their personal experiences also provided insight into the individual’s rationale behind formulating their responses (Kvale, 2007). Although specific individuals were targeted, participation was completely voluntary, and participants were contacted with discretion. Recruitment was primarily through email, and employed a technique known as ‘snowball sampling’, whereby asking interviewees available to suggest others who might be willing to be interviewed (Question 8) (Marshall & Rossman, 2011). In the process, the number of participants gradually expands to those who have been referred.

In addition to the elites, and after the interviews were conducted, a few community garden managers were contacted to determine the current name, size, number of allotments and size of individual plots. Such details were difficult to locate and important to establishing a baseline for this study. Since the individuals were not the focus of an in-depth interview, but were briefly surveyed, they are not profiled in this study. The survey questions are listed in Appendix B, and the results were included in the community gardens discussion concerning size classes and attributes in Section 5.5.3.

#### 4.2.1 Resulting Participants

With the City of Victoria as the primary sampling site, a small sample population of 12 participants were selected to interview (Marshall & Rossman, 2011). The resulting participants were composed of 4 individuals from Group 1's city planners, 6 individuals from Group 2's community members, and 2 urban growers from Group 3. Although the resulting sample size of each group was unequal, many of the participants had qualifications or felt they associated with more than the single group they selected. While the perspectives from each group were important and provided interesting comparisons, the responses from the interviews as a whole offered more definitive findings as they represented the core selection of participants: a group of individuals involved with urban agriculture in the City of Victoria. It was also important to note that the views expressed in the interviews were that of the individual, and did not necessarily represent the views of the organizations with which they were affiliated.

Group 1: City of Victoria planners involved with planning for community gardens and GIS

From Group 1, four individuals participated. The participants cannot be identified due to the small sample population, as there was a concern that the identification of one individual may implicate others whom wished to remain anonymous. Anonymity was also important because the opinions and views expressed by planners were based on their experiences and were not necessarily aligned with those of the City of Victoria. The four individuals were represented with the following generic pseudonyms: Sarah Quinn, Paul Leval, Robert Boyd, and Patrick Davis).

Group 2: Educators/Non-profit/Community groups engaged in enabling; facilitating; regulating urban food production,

There were six participants in Group 2. All agreed to waive confidentiality in this thesis and have their results attributed to them in the final discussion. The participants were Chloe Markgraf, Gabe Epstein, Tamara Schwartzentruber, Maeve Lydon, Patti Parkhouse and Lenore Rankin. Their candidacy as interviewees and involvement with urban agriculture in the City of Victoria is detailed in the following paragraphs.

Chloe Markgraf is a co-author of the chapter *Cultivating Food Security: Creating a Land Inventory and Urban Food Landscape on Vancouver Island* in

VICRA's Local Food Project with Chris Kay. Markgraf is also a Director with the Fairfield Gonzales Community Association and a community garden activist.

Gabe Epstein is one of the coordinators of the Gorge Tillicum Urban Farmers (GTUF), a neighbourhood group focusing on producing and engaging in food security that began in 2008. As a retired schoolteacher, he has taken up the role of urban agriculture facilitator by sharing knowledge and encouraging neighbours to put their backyards into production.

Tamara Schwartzenruber was part of the Initiating Committee of Transition Victoria (ICTV) and a Community Research Fellow with the Office of Community Based Research 2010-2011. She is also a local permaculture expert and published the report *Permaculture in Victoria Parks: A Feasibility Study* in 2009. She was actively involved with Spring Ridge Commons, and is currently volunteering with Transition Victoria's the Capital Nut Project.

Patti Parkhouse is actively involved in Victoria West as a Board Member with the Victoria West Community Association and as a Project Coordinator for the Vic West Food Security Collective with Transition Victoria. She is an urban agriculture advocate in her community, establishing the Rayn or Shine Community Garden, Bamfield Commons, Vic West Community Tea Garden, and a public food forest - the Evans Street Orchard.

Maeve Lydon works for the Institute for Studies & Innovation in Community-University Engagement at the University of Victoria. She was also a contributor to VICRA's Local Food Project Report. Her area of specialization includes community mapping and participatory planning for NGOs, organizations, and neighborhoods. She also is part of the Common Ground Community Mapping Project, and the GroundWorks Learning Centre.

Lenore Rankin has been the Fernwood Neighbourhood Resource Group's Development Director since 2005. Rankin was recommended by selected interviewees as she is interested in creating an urban agriculture model in Fernwood which is economically integrated and in support of the community.

Group 3: Individuals engaged in food production within the City of Victoria

Only two participants were recruited from Group 3, but both agreed to waive confidentiality. The participants were Sol Kinnis, who works as an urban farmer at City Harvest Co-operative, and Chris Kay, who is on the Board of Directors of Haliburton Community Farms involved with the small business farm there. Chris is also a co-author of the chapter *Cultivating Food Security: Creating a Land Inventory and Urban Food Landscape on Vancouver Island* from VICRA's Local Food Project with Chloe Markgraf.

#### **4.2.2 Interview Process**

The interview process was purposefully sequential due the anticipated lack of availability of Group 2's and Group 3's participants, as well as the potential for contrasting the perspectives of government and non-government employees. Groups 2 and 3 were approached first because it was anticipated that they would be the most difficult to make contact with due to the nature of their work and hours of availability. It was also believed that through their work they would be able to provide referrals for interview participants from Group 1, supplementing the pool of City participants to draw from. Therefore after interviewing participants from Groups 2 and Group 3, the City of Victoria employees involved with planning for community gardens and urban agriculture from Group 1 were interviewed.

Conducting interviews in this order also allowed me to understand and articulate the perception and opinions of the general public represented in Group 2 and 3. Although this process could have been reversed, whereby City employees were interviewed before the non-government and public participants, the anticipated scheduling challenges of Groups 2 and 3, and my desire to have a grounding knowledge in perspectives outside of the City employees resulted in this specific sequence. Since the majority of the participants interviewed were community members, interviewing Group 2 and Group 3 first allowed me to distinguish their perspectives while comparing the similarities and differences with views of Group 1's City employees.

The interviews were generally 60-90 minutes long and were conducted during suitable daytime hours and at locations mutually decided upon between the interviewer and interviewee. In order to accommodate and respect the time constraints of each

interviewee, the places selected were based on convenience. The interviews occurred at various locations such as their place of work, residence, or a coffee shop nearby to those locations.

All participants agreed to have their interview recorded and transcribed. The interviews were recorded using the Zoom H2 Handy Recorder. A few interviews were recorded in multiple segments due to interruptions or the need for a break between questions. Hand written notes were recorded into a journal to account for these transitions and throughout the interview as a precautionary measure should the audio recording fail or reach its capacity for recording data. These notes also helped draw out themes and focus questions during the interview. This research was approved by the University of Victoria's Human Research Ethics Board, protocol number 11-473 on November 29, 2011. The interviews were conducted from the end of January, 2012 until the beginning of March, 2012.

#### **4.3 Question Development**

Drawing from the focused literature review of Chapter 3, the Portland, Vancouver and Nanaimo UALIs were consulted to develop interview questions and proposed site selection criteria. In particular, the methods used in the Nanaimo UALI were adapted because it contained a detailed methodology with an existing framework of interview questions, whereas the Portland and Vancouver UALIs did not.

To ascertain site selection criteria suitable for identifying land for community gardens in the Victoria, the interview questions explored the key components of criteria development, including: determining primary and secondary criteria, suitable size classes, participants' most important site selection criteria and most important criteria in terms of food security, and the barriers and supports to allotting land to urban agriculture in Victoria. The final interview questions are listed in Table 9, and the rationale behind the development of each question is explained throughout the remainder of this section (4.3.1- 4.3.6).

**Table 9:** Primary Interview Questions

1) Based on a review of previous land inventories conducted, these are the criteria I will be applying to the City of Victoria:

Primary Criteria

- Soils (ALR and well drained soils)
- Not to include protected green space (Sensitive ecosystems, wetlands, waterways and floodplains)
- Land-use (Public and Institutional, Residential)

Secondary Criteria

- Water availability (based on water mains)
- Accessibility - Proximity to bus stops; proximity to bike lanes and sidewalks
- Distance from major roads and rail corridor (30m away)

The attached Table 1 depicts additional Site Selection Criteria to be considered.

- Of the Primary criteria listed here, is anything important missing?
- Of the Secondary criteria listed here, is anything important missing?

*Then depending on parcel size (see Table below):*

- Identify sites for Community Gardens based on vacant lots and proximity to multi-family residential areas.
- Identify sites for alternative urban agriculture, such as edible forests and community commons.

2) Can you provide feedback on the size classes identified in another study (see following table)?

	Primary Parcel Category		Subset Category	
<b>Category</b>	Large-Scale Growing Operations	Small-Scale Growing Operations	Community Gardens	Growing on Impervious Surfaces or Poor Soil
<b>Size*</b>	0.1 hectare+ (1000 sq. m+)	.009 - 0.1 hectare (92 -1000 sq. m)	0.015 - 1.4 hectare (150-14,000 sq. m)	.045 hectare+ (465 sq. m+)
<b>Use</b>	CSAs, urban farms, community orchards, animal husbandry, horticulture, nursery, beekeeping	Farm stands, educational gardening programs, composting, vermiculture, food bank gardening, herb growing, beekeeping, market gardens, edible landscaping, fruit trees	Gardens with individual or communal plots; gardens with shared space and resources	Vertical gardening, indoor growing (sprouts, mushrooms, aquaculture, vermiculture), greenhouses, farm stands, processing facilities, farmers markets, container gardening, hydroponics

3) What is the most important criterion when selecting a site? Why?

4) In terms of food security, what site selection criteria do you think are most important? Why?

5) What do you perceive to be barriers to allotting land for urban agriculture?

6) What do you perceive to be supports to allotting land for urban agriculture?

7) As part of my project, I would like to map existing urban agriculture locations in the City of Victoria. Would you mind sharing the locations of any existing community gardens, SPIN farming locations, and other forms of urban agriculture you're aware of?

8) Do you suggest anyone else I should speak to?

#### 4.3.1 Question 1: Primary and Secondary Site Selection Criteria

The objective of Question 1 was to engage participants in a debate over the suitability of proposed criteria from previous studies, to provide a context for the discussion evolve from and to identify any missing criteria. As discussed in Chapter 4's focused literature review, Nanaimo's location on Vancouver Island and population are comparable to Victoria's, allowing the interview questions to provide an appropriate platform to draw from and build upon. For the purpose of this research, Nanaimo UALI's hierarchy of three primary and three secondary criteria was adopted for the City of Victoria interviews. The primary criteria were definitive physical characteristics which determined if the site was suitable for further consideration or not, as it was measured at the landscape scale. The secondary criteria assessed a potential site at a finer scale and were measured at the community level (Cramer, 2009).

As a means of leading into Question 2, the following statements were presented for consideration:

*Then depending on parcel size:*

- Identify sites for Community Gardens based on vacant lots and proximity to - multi-family residential areas
- Identify sites for alternative urban agriculture, such as edible forests and community commons

Each statement draws from similar considerations in the Nanaimo UALI. The first statement's desire to find vacant lots in proximity to multi-family residential areas was proposed to connect sites with a potential user base.

Not to be limited exclusively to the six primary and secondary criteria, interviewees were also provided with a sheet listing additional attributes for consideration (see Appendix Table B1). The Attribute Table was adopted from site criteria considered in the Portland and Vancouver UALIs as potential criteria for site selection in Victoria's UALI. The Attribute Table featured physical attributes as the primary criteria and land use as the secondary criteria for identifying suitable sites. Though not directly addressed in the interview questions, the Attribute Table functioned as supplemental material for interviewees to review before or during the interview, to provide context and stimulate discussion concerning site selection criteria.



Overall, the primary and secondary criteria presented in Question 1 were not definitive, but were refined through the interview process. To ensure the criteria were thoroughly considered, interviewees were also asked if anything was missing from both the primary and secondary hierarchies.

### **Primary Criteria**

#### *1) Soils (ALR and well-drained soils)*

Soil quality and contamination are contentious issues when planning for urban agriculture. Although there is not any land designated to the Agriculture Land Reserve (ALR) in the City of Victoria, the criterion ‘ALR and well-drained soils’ was included to remain consistent with Cramer’s questions(2005) and because there was a section of the ALR bordering the City of Victoria, the Cedar Hill Golf Course. Soil drainage was also listed as an indicator of good soil quality, as Victoria is subject to long bouts of precipitation during the winter months.

The potential for soil contamination was recently examined in University of Victoria graduate student Heather McLeod’s Master’s thesis concerning the airborne deposition of pollution on food plants in the urban environment of the City of Victoria (2011). McLeod’s findings indicated the level of the heavy metal contaminants lead and cadmium on produce grown in Victoria were “well above the FAO/WHO recommended maximum level”, but no better than produce grown in a rural setting or store-bought (p.110). Levels of magnesium and zinc were also found to be “higher than the concentrations found in produce grown elsewhere in the world” (p.111). To mitigate this, McLeod recommends avoiding areas adjacent to areas with high traffic and/or industrial activities which increase exposure (McLeod, 2011, p.122). Though the issue of soil toxicity was not explicitly brought up during this question, it was outlined in more detail in an appended Attribute Table as ‘soil conditions’. The Attribute Table also stated sites were to be considered contaminated unless proven otherwise. This was to negate the cost of soil testing.

2) *Not to include protected green space (sensitive ecosystems, wetlands, waterways and floodplains)*

This site selection criterion was included because a few sensitive ecosystems remained within the City of Victoria. Sensitive ecosystems are defined by the Ministry of the Environment as relatively unmodified, rare and fragile terrestrial ecosystem types, whereby “only remnants remain due to disturbance from human activities”. Sensitive ecosystems also “possess qualities that make them important in the physical and social fabric of our communities and significant from both a provincial and national perspective” (McPhee et. al, 2000).

As discussed in the Introduction (1.5), the protection of the Garry Oak ecosystem is an ongoing concern because it is an important part of the ecological identity of Victoria and it is experiencing significant habitat losses on Vancouver Island. Similarly, riparian zones were also considered unsuitable for growing food and often designated as protected areas.

3) *Land-use (Public, Institutional, and Residential)*

Land-use denotes the current activities on site as well as the ownership, both of which have an impact on the decision making process and potential tenure of the site. In British Columbia, the BC Assessment Authority classified a property’s ownership and land use into 9 categories: residential, utilities, supportive housing, light and major industry, business and other, managed forest land, recreational property, non-profit organizations, and farms (2013). Crown land was not included in the BC Assessment because it was owned by the provincial or federal government and therefore excluded from taxation unless the land is occupied or leased.

Though the BC Assessment Authority provided a detailed classification of property ownership and land use in British Columbia, Cramer’s listing of land use as public, institutional and residential land was presented to interviewees because they were prioritized land uses and offered simplified categories to stimulate discussion.

## Secondary Criteria

### 1) *Water availability (based on water mains)*

Water availability was based on access to water mains. This was an infrastructure concern, as access to water is important during seasonal droughts.

### 2) *Accessibility - Proximity to bus stops; proximity to bike lanes and sidewalks*

Although Victoria's UALI focused on physical characteristics, accessibility was considered a social construct which could be physically measured by distance. For example, if a site lacked access to public transportation it may be deemed unsuitable.

### 3) *Distance from major roads and rail corridor (30m away)*

The distance from major roads and rails corridors was included to acknowledge the potential hazard a large volume of traffic could have on locating a garden. The main concerns were site safety and the unknown effects of pollution in proximity to major roads or rail corridors. The City of Victoria has a small section of the Esquimalt to Nanaimo Rail located in the community of VicWest. There were also a few major roads connecting to the TransCanada Highway leading up island.

## 4.3.2 Question 2: Determining Size Classes for Community Gardens

As discussed in the focused literature review (3.4), Vancouver's UALI contained a detailed chart listing various scale ranges and types of urban agriculture suitable to each size class (Table 7). For the purpose of this study, Vancouver UALI's size classes were used as reference point to ask the questions: *Can you provide feedback on the parcel size classes identified? And, do you think these apply to the City of Victoria?*

Although the objective of this research was to identify sites for community gardens, I have included Table 7 to be consulted during the interview as a means of generating discussion about the potential for urban agriculture in all forms in Victoria.

## 4.3.3 Question 3: Most Important Criteria

After discussing the primary and secondary criteria, Attribute Table and size classes, interviewees were asked what the most important criteria were when selecting a site and why. There were no criteria provided in this question, leaving it open to the

individual's interpretation. The rationale behind asking this question was to draw out the individual's opinion, unique experiences, and to ensure that priority criteria were identified for analysis.

#### **4.3.4 Question 4: Most Important Criteria in the Context of Food Security**

Shifting the context, Question 4 was employed to determine the most important site selection when planning for food security and to explore the participants' understanding of the definition of food security. It was also added to see if they would change their answer from Question 3 when asked to contemplate food security. No criteria were provided for evaluation in this question.

#### **4.3.5 Questions 5 & 6: Barriers and Supports to Allotting Land for Urban Agriculture**

Participants were asked to identify what they perceived as barriers and supports for allotting land to urban agriculture. This allowed their personal and professional experiences with urban agriculture to be revealed and examined. Their unique perspectives were sought to provide greater insight concerning hidden issues or underutilized supports. No criteria were provided to set the context of this question.

#### **4.3.6 Questions 7 & 8: Site Identification and Participants**

Asking interviewees to identify existing urban agriculture in Victoria allowed for the status of known and existing sites to be confirmed, and for interviewees to identify new or unknown locations that were not generally known to the public or researcher. Using ArcMap 10, participants had the opportunity to explore a digital mapping environment at various scales and interact with a map illustrating satellite imagery of the City of Victoria. The map also contained digitized layers of a few existing sites, potential and recommended sites, as well as layers provided by the City of Victoria, such as parks, greenways and water main locations.

To identify additional participants, I also asked interviewees to recommend participants at their discretion. The purpose of this question was to increase the number of potential interview candidates, and confirm the suitability of individuals approached for interviews.

#### **4.4 Interview Analysis**

The interview analysis was primarily composed of 1) thematic coding, 2) identifying site selection criteria and 3) prioritizing site selection criteria. The interviews were first transcribed into a word document using Express Scribe transcription software. Each interviewee's transcript was then duplicated for the purpose of retaining an original, unaltered copy, and having a working transcript to accommodate changes in a transcript's structure during analysis, without compromising the integrity of the original interview's chronology for later reference (Kelly & McGrath, 1988).

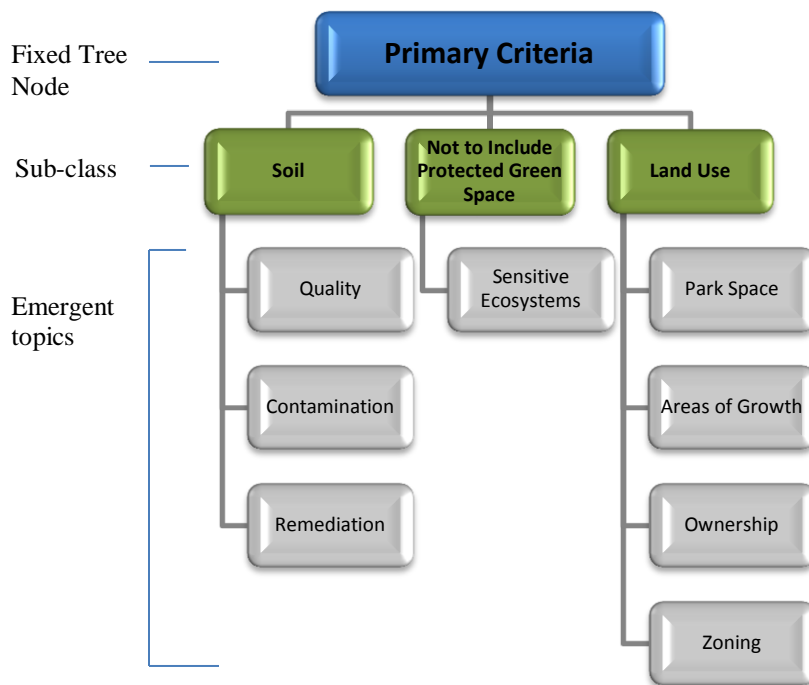
The working transcript was essential to organizing the interview data because the semi-structured nature of the interviews resulted in the continuous emergence of responses from previous questions at later points during the interview. Therefore, analysing the response to a single question was not limited to the question itself, but formulated over the course of the interview.

##### **4.4.1 Thematic Coding**

The thematic analysis of each interview consisted of organizing the text into emergent topics ('meaning units', Kvale, 2007, p.107), whereby the responses were arranged according to question. This enabled the open coding of emergent topics and themes, and axial coding of fixed categories (Marshall & Rossman, 2011, p.214; Kvale, 2007, p.105), using each question and the proposed criteria to organize and understand the volume of data which required processing. The fixed categories provided an anchor and a point of reference from which discussion would evolve. A secondary reading of each interview's emergent topics allowed for sub-themes in relation to the fixed categories to emerge, and new points of discussion were identified.

After re-organizing the transcripts according to each question and identifying fixed and potential sub-themes themes, NVivo 9; a qualitative data analysis (QDA) tool, was used to further code and analyse the text to identify primary, secondary and emergent criteria. The interview responses were thoroughly examined paragraph by paragraph, and the responses to each question were assigned a coded hierarchy, whereby themes emerged in reference to a specific topic. For example, with Question 1, the primary and secondary criteria were each assigned a tree node and three proposed criteria as sub-categories. Following this model in Figure 9, any discussion concerning sub-categories

such as soil quality or soil contamination, were examined in relation to the Question 1's primary criteria of soil. In addition, the size classes discussed in Question 2 provided a framework for employing a coding hierarchy for analysis.



**Figure 9:** Example of the primary criteria's fixed tree nodes, sub-categories, and emergent topics.

Since Questions 3-6 were open ended and concerned the most important criteria, barriers, and supports, multiple themes emerged with reference point case studies or were coded as free nodes and added to corresponding tree nodes where possible. The emergent criteria or new themes to consider were classified as free nodes and examined after the interview coding had reached a point of theoretical saturation (Marshall & Rossman, 2011, p.220).

#### 4.4.2 Identifying Site Selection Criteria

Despite previous UALIs consulting with focus groups and conducting interviews with stakeholders, most existing studies do not discuss the process used to establish site selection criteria. To resolve this knowledge gap, my study explores the frequency of positive responses in the interviews to establish site selection criteria.

After careful coding and thematic analysis of the interviews, comments regarding site criteria were interpreted in terms of positive or negative responses, in support of or

not, as well as the presence or absence of a response. This approach is known as a content analysis and was used to evaluate participants' responses into the fixed categories of proposed criteria and assess new criteria as they emerged (Kvale, 2007; Jackson & Verberg, 2007).

A content analysis was applied to Questions 1, 3 and 4, with the results of the analysis tabled into an evaluation matrix presenting a paired comparison of the criterion's importance (Voogd, 1983, p.102). The criteria were then displayed with the number of interviewees in support, in opposition, or not commenting on a criterion according to their Group number. The suggested 'missing' criteria from Questions 1a and 1b were considered emergent criteria, and if two or more interviewees suggested a new criterion, it was included in the same content analysis as the proposed criteria illustrated in Table 15. A single suggestion independent of the other interviewee's comments was still included in the discussion of potential missing criteria, but considered an outlier and excluded from the content analysis.

#### **4.4.3 Prioritizing Site Selection Criteria**

Culminating results of the content analysis, a multi-criteria evaluation (MCE) was undertaken to determine the final site selection criteria. A multi-criteria evaluation (MCE) is the process used in urban and regional planning to explore the "choice-possibilities in light of multiple criteria and conflicting priorities" (Voogd, 1983, p.21). The advantages of conducting a MCE were the incorporation of different groups' and individuals' interests, the reduction of selection criteria, and the accountability for decisions concerning site suitability. By using the MCE approach and illustrating the weighting of preferences through content analysis in a paired comparison matrix, I ranked the criteria to create a hierarchy of the highest priority criteria to the least important criteria (Voogd, 1983).

In this case, the MCE prioritized criteria based on the frequency of positive responses throughout the results of the interviews' content analysis. Furthermore, the MCE improved upon the cumulative content analysis results by considering the transferability of criteria into a GIS mapping environment and availability of data for analysis. The final list of site selection criteria was generated by evaluating the results of the interviewee's MCE and determining the criteria's viability for mapping.

#### **4.4.4 Mapping Existing Urban Agricultural Activities**

While sites identified by participants were not analysed systematically, existing sites were investigated further to determine their location and the recommended locations were examined during the UALI. A map culminating their responses was created to illustrate existing urban agriculture activities in the City of Victoria.

#### **4.4.5 Participant Recommendation**

The recommended participants were not included in the interview analysis of Chapter 5, but remained reference material for the primary interviewer to consider.

### **4.5 Conclusion**

The 12 interview participants represented urban agriculture experts from 3 different groups: community leaders (6), city planners (6) and urban producers (2). Drawing from their personal and professional experiences, a participant's insight was not limited to the category which best represented them, but displayed a diversity of experiences. While each interviewee was aligned with their agreed upon Group, their responses were based on their experiences with urban agriculture as a whole.

The interview design used the Portland and Vancouver UALI's site selection criteria, the Nanaimo UALI's interview questions, and reviewed the characteristics of UALIs. Semi-structured interview questions allowed criteria to be presented and interrogated, while the discussion progressed organically. The interview analysis employed transcription, thematic coding, and a content analysis to identify site selection criteria, as well as the main barriers and supports for allotting land to urban agriculture. Lastly, a multi-criteria evaluation prioritized the interviewee's recommended (Table 22) site selection criteria for GIS interpretation and implementation in Chapter 6.



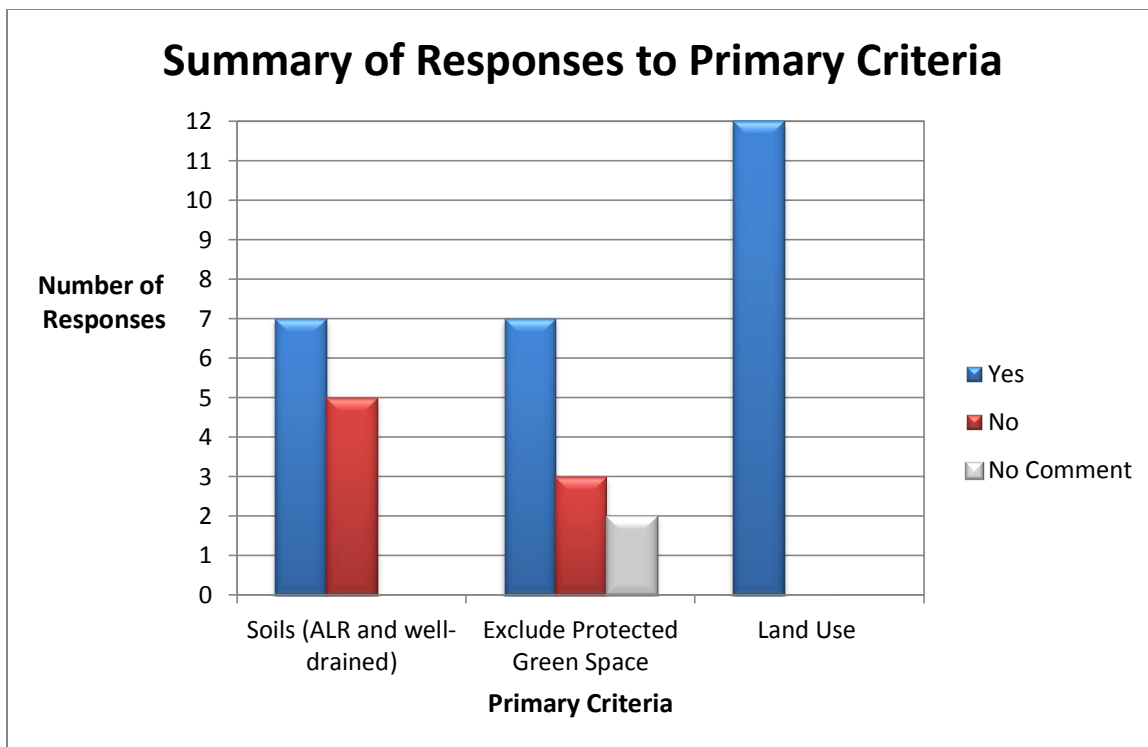
## **Chapter 5: Interview Analysis and Establishment of Site Selection Criteria**

### **5.1 Introduction**

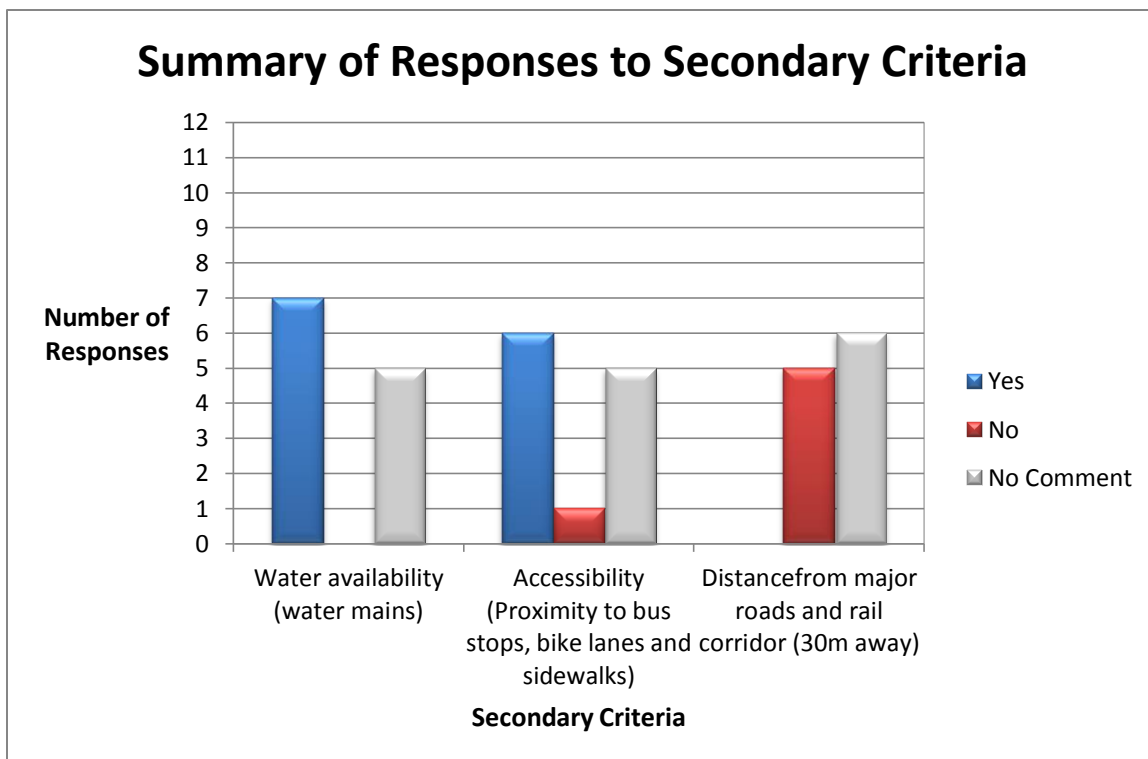
This chapter presents participant responses to each question, and uses content analysis to establish site selection criteria and identify barriers and supports. For Questions 1, 3 and 4, a content analysis was utilized to determine site selection criteria based on the frequency of response and interpreting the type of response into positive, negative or no comment. Barriers and supports were analysed and discussed using thematic analysis. Furthermore, participant's associated interview Group and their individual experiences with urban agriculture were considered to establish their point of view and explore the rationale for their responses.

### **5.2 Question 1: Primary and Secondary Criteria**

The evaluation of the primary and secondary criteria was contingent upon interview participants volunteering feedback on the criteria presented. Many interviewees chose to provide insight and feedback as to the effectiveness and accuracy of the criteria presented, including the Attribute Table. The following discussion represents the responses related to each criterion which arose during the interview. The responses to the primary and secondary criteria were organized according to each interview group, and I performed a content analysis to document if the response was positive (in agreement or support of criterion), negative (disagreement with criterion) or no comment. A summary of responses to primary and secondary criteria are illustrated in the graphs of Figures 10 and 11. A detailed breakdown of responses to the primary and secondary criteria according to each Group is featured in Tables 10-15.



**Figure 10:** Summary of Content Analysis Responses to Primary Criteria.



**Figure 11:** Summary of Content Analysis Responses to Secondary Criteria.

### 5.2.1 Soils (ALR and well-drained soils)

All of the participants commented on soils and considered the quality, pollution potential, contamination, remediation and ability to build soil important. Of the 12 individuals interviewed, 7 supported using soils as a primary criterion and 5 were opposed (Table 10). The 7 in support of soils were composed of Group 2's educators, non-profit and community groups and Group 3's urban producers, while the opposition was predominantly from Group 1's City planners.

**Table 10:** Soils Evaluation Matrix

Soils	Response		
	Yes	No	NC
<b>Group 1: City Planners</b>	1	3	0
<b>Group 2: Community Leaders</b>	4	2	0
<b>Group 3: Urban Producers</b>	2	0	0
<b>Total</b>	<b>7</b>	<b>5</b>	<b>0</b>

#### Summary of Soils Discussion

Most participants (7) favoured using soil as a primary criterion because it provided a practical and physical foundation to build soil upon. Participants were also interested in the presence of soil and soil quality, the potential for contamination and effort required to remediate soil on site. However, some participants were opposed to using soils as a primary criterion because they believed it could be imported or built up.

In terms of the contaminants discussed by interviewees, it was important to clarify that cadmium and chromium are contaminants associated with automobile traffic, while lead is more prevalent at the household level. Lead is a contaminant ubiquitous to the urban residential setting, and the most common sources are from leaded house paint and gasoline, both of which have been removed from public use since the late 1970s and 1990s respectively (Finster, Gray & Binns, 2004, p.246). Schwartzentruber and Kinnis also found that levels varied across sites, and within sites. Although the types of contaminants and the levels of contamination were not explored further in this study, they should be considered for future studies.

In contrast, the five participants opposed to using soil as a determining factor for site selection argued that the analysis of the land base could be expanded to include

mixed or impervious surfaces. An increased land base would be advantageous as it would provide greater opportunities for discovering potential sites, however, surfaces with inadequate or deficient soil would require additional infrastructure or the introduction of new soil. Such sites may only be able to support the smaller style of allotment or commons gardens. For as recommended by Boyd, it might be more appropriate for large-scale gardens to have soil on site to reduce costs and support a productive and self-sustaining ecosystem, than require small sites to have soil.

There is strategic value in sites that otherwise might not be ranked highly in my analysis. For example, the raised gardens on a former gas station property at the corner of Burrard and Davie Streets in Vancouver, BC, are seen as valuable both to the community and in terms of “marketing” the idea of urban agriculture despite otherwise not appearing as a valuable site.

### 5.2.2 Not to include protected green space

The majority of interviewees (7) agreed with excluding protected green space from the inventory in order to preserve the integrity of existing ecosystems, as well as respect existing land covenants (Table 11). In contrast, the individuals in opposition (3) believed protected green space and sensitive ecosystems could be supported in combination with community gardens.

**Table 11:** ‘Not to Include Protected Green Space’ Evaluation Matrix

Not to include Protected Green Space	Response		
	Yes	No	NC
Group 1: City Planners	3	1	0
Group 2: Community Leaders	3	1	2
Group 3: Urban Producers	1	1	0
<b>Total</b>	<b>7</b>	<b>3</b>	<b>2</b>

It was important to recognize Quinn questioned the term ‘protected green space’, as she believed there was none in Victoria and clarified that there were only ecologically sensitive areas in Victoria. Upon further reflection of the interview responses, the term ‘protected green space’ may have given the impression an area was off limits to human activities, while a sensitive ecosystem was limited to low-impact activities such as

passive recreation. Though Quinn was correct in her assumption that there were no protected green spaces within the City of Victoria, there were sensitive ecosystems which were considered instead.

#### Summary of Protected Green Space

Although most interviewees (7) were in favour of excluding protected green space, Markgraf and Kay presented a formidable argument for supporting sensitive ecosystems in conjunction with food production. Kay described a restoration project on Haliburton Farm as a way to “combine growing food in the same area with wetlands”. He advocated growing food using organic or sustainable methods in proximity to healthy ecosystems provided benefits such as insects. The majority of interviewees felt that ecologically sensitive areas should be eliminated from site selection during the inventory. However, an ecologically sensitive area could be included as a positive feature for sites to be located ‘in proximity to’.

#### **5.2.3 Land-use (Public, Institutional, Residential)**

All participants supported land use type as a criterion, but each considered a different aspect of land use. Participants responses considered ownership (5), adjacent land use (5), parks and public land (4), projected areas of growth (2), underutilized land (2), and the length of tenure (2) and zoning (1).

#### Summary of Land Use

Identifying and distinguishing land use in terms of ownership and activities on site was an important criterion for all participants. The main categories of land ownership considered by the interviewees were public, institutional, residential, commercial and industrial. The subclasses of these categories were equally important, as each entailed a different type and condition for land use.

In addition to the land use and ownership classes identified by the BC Assessment Authority during Question Development (4.3.1), Crown land, public, commercial, and residential were also identified by interviewees. Crown land is commonly referred to as public land and represents government-owned municipal, provincial or federal lands. Public land is often grouped amongst institutional land, including land use by community or religious groups, charitable organizations, and for education or health care.

Commercial land is designated for business and includes shops, offices, and service centers, whereas industrial land is associated with commercial but used for manufacturing, processing, and storage (City of Markham, 2005, p.3-1.). Lastly, residential land is used for housing, such as homes, apartment buildings, or condominiums.

#### *Adjacent Land Use*

Based on Parkhouse, Rankin, and Schwartzentruber's recommendations, the adjacent land use should be considered because of its influence on the development of a site. They suggested determining where the demand for community gardens existed, and gave the example of high density residential areas as a priority adjacent land use.

#### *Parks and Public Land*

Of the participants discussing the use of park land, 2 planners believed the City might acquire new park spaces which would have a greater potential for including a community garden. However, 2 participants believed parks and public land should be included in the inventory because community gardens were comparable to any other use of park space (Davis) and parks were public property funded by taxpayers (Markgraf).

#### *School Land*

An interviewee school properties had a substantial amount of open land to include in the inventory, investigating Leval's assumption has proven difficult, as the Greater Victoria School Board (61) has only disclosed the locations of current school properties. Therefore only existing schools could be examined in the inventory.

#### *Future Land Use and Length of Tenure*

Sites scheduled for future development should be considered for potential interim gardens. Although the length of tenure may be difficult to ascertain, sites available for over three years should be prioritized for interim gardens. The future land use should be considered during site analysis because of the potential to address or avoid land use conflicts before creating a garden.

### *Underutilized Land*

Identifying underutilized, marginal land and marginal park land, which may be vacant, or partially vacant, but was primarily underserving its intended purpose, was also recommended by an interviewee.

### *Zoning*

An interviewee recommended to not restrict the inventory to public, institutional and residential land, but to broaden the scope of the study. For example, areas classified as industrial areas such as Rock Bay should be considered mixed use and examined at a finer scale.

## **Secondary Criteria**

### **5.2.4 Water Availability (based on water mains)**

Of the 12 participants, 7 agreed with water availability as a criterion, while 5 participants did not comment (Table 12). Of the 7 participants agreeing with water access, 5 supported it as a primary criterion and 2 suggested it remain a secondary criterion. Based on the 5 positive responses from interviewees commenting on water access, it should be elevated to a primary criterion.

**Table 12:** Water Availability Evaluation Matrix

Water Availability (based on water mains)	Response		
	Yes	No	NC
<b>Group 1: City Planners</b>	3	0	1
<b>Group 2: Community Leaders</b>	3	0	3
<b>Group 3: Urban Producers</b>	1	0	1
<b>Total</b>	<b>7</b>	<b>0</b>	<b>5</b>

### Summary of Water Availability

Water availability was considered based on the presence or absence of water mains, with the size of service was considered as well. The following discussion concerning water availability examines the size and cost of service, as well as establishing water access.

### *Cost of Water Service and Access*

In terms of costs associated with metered water, the consumption charge is the cost of water supplied by the Capital Regional District while the service charge covers the cost to maintain the City of Victoria and Esquimalt waterworks system. Though the cost of obtaining water access may present a barrier to the development of the site, funding was available through the City of Victoria's Neighbourhood Development Grants. A community garden proposal may qualify for \$5,000 under the Neighbourhood Enhancement Matching Grant, yet there was the opportunity to be part of a bigger community project within the Neighbourhood Greenways Grants for up to \$25,000. Therefore the cost of obtaining water access may not be a significant limiting factor, but determining if there was a water main and service on site remains a priority.

Furthermore, Kay and Rankin's suggestion to evaluate the potential for water collection on site was not included in the site selection criteria, as it was an infrastructure opportunity rather than a necessity, and could be a consideration during the development phase.

#### **5.2.5 Accessibility (proximity to bus stops; proximity to bike lands and sidewalks)**

When considering accessibility, 6 interviewees agreed while 1 interviewee was opposed to using it as a site selection criterion (Table 13). Of the 6 participants in support of accessibility, 2 were from Group 1's City planners and 4 were from Group 2's community leaders. The one participant opposed was from Group 1. The only group to not comment on accessibility was Group 3's urban producers.

**Table 13:** Accessibility Evaluation Matrix

Accessibility (Proximity to bus stops, bike lanes and sidewalks)	Response		
	Yes	No	NC
Group 1: City Planners	2	1	1
Group 2: Community Leaders	4	0	2
Group 3: Urban Producers	0	0	2
<b>Total</b>	<b>6</b>	<b>1</b>	<b>5</b>



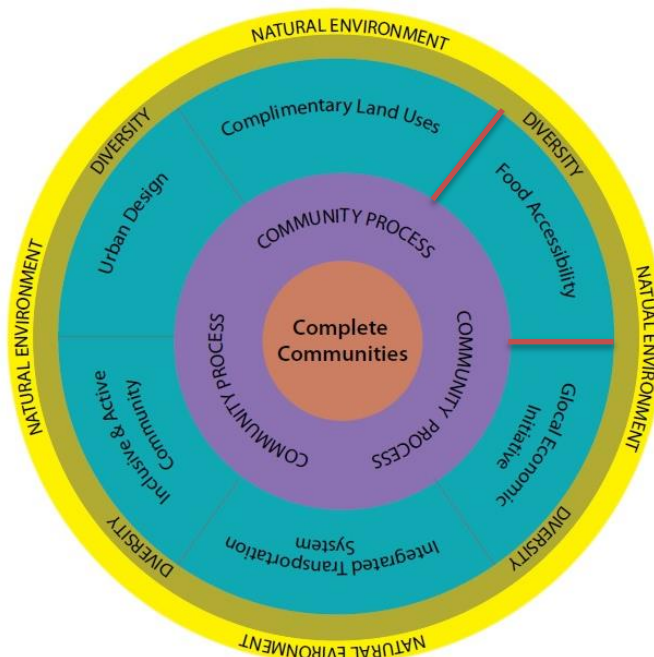
### Summary of Accessibility

The seven contributing participants examined the physical access to sites, focusing on public transportation and parking, future growth, complete communities and walkability, as well as visual access to a site. When considering the availability and access to public transportation in Victoria, interviewees' presented conflicting perspective, and investigating if there is adequate access to public transportation in Victoria has since proven inconclusive. While there is an abundance of public transit throughout Victoria, the efficiency in terms of timing and capacity may prove to be limiting factors for ridership amongst a growing number of public commuters (Cleverley, 2012).

Leval's suggestions to include community gardens as part of a complete community and to situate them within 5 minutes of a bus stop and residential access, was also further explored. The term 'complete community' is increasingly popular in urban planning and has been featured in government, NGO and private sector publications (Donaldson, Oldnall, O'Neill, Sol, & Whyte, 2010, p.18). A complete community is best defined by the SmartGrowth BC as (Curran & Leung, 2001):

...are areas where services, amenities and commercial development are close enough to residential areas that residents can meet their daily needs in their neighbourhood without driving (p. 12).

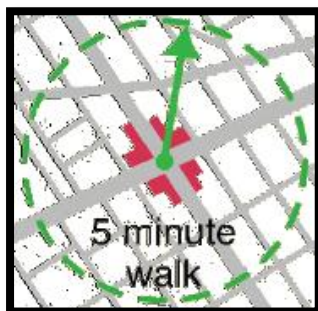
Part of fulfilling a resident's daily needs depends on food accessibility, which is illustrated in Figure 12, as a key part of the complete community process, "intended to act as guiding principles for communities" (Donaldson et. al, 2010, p.38).



**Figure 12:** Complete Community Process (Donaldson et al., 2010, p.28).

To support community gardens, Leval suggested looking at complete communities such as Town Centres, Large Urban Villages and Small Urban Villages, which can act as a focal point. The Town Centres are large shopping centres, providing “commercial, office, visitor accommodation and community services to support adjacent Traditional and Urban Residential areas, General Employment areas and the surrounding region” (City of Victoria, 2012b, p. 189). The Urban Villages are defined as “nodes of commercial and community services that support adjacent Traditional and Urban Residential areas” with the Large Urban Villages serving some General Employment areas (City of Victoria, 2012b, p.193). Locating community gardens in proximity to these areas is advantageous because of the increased range of activities, foot traffic and the potential for community support.

To address Leval’s suggestion to locate a community garden site within a ‘5 minute walk’ of a bus stop or residential access, the corresponding distance was determined. This distance translates to approximately 400 meters in radius from a centre point of interest (Western Australia Planning Commission, 2009, p.48). A simplified illustration of the five minute walk as a form of measure is featured in Figure 13.



**Figure 13:** The five minute walk as a principle of New Urbanism (Congress for the New Urbanism, 2011).

The ‘5 minute walk’ is referred to by planners as a part of a walkable catchment, walkshed or pedestrian shed (pedshed), described as the walkability of an area. An extension of the walkable catchment’s ‘5 minute walk’ is a 10 minute walking radius of 800 meters. The 10 minute walk from the point of interest represents the distance people are willing to walk to a major transportation node such as railway, or a town centre (Western Australia Planning Commission, 2009, p.48). Although I considered applying the 800m range of a 10 minute walk, access to transportation was not identified as an issue or a priority during the interviews, and was therefore omitted. Community gardens were best described as a neighbourhood feature or community service, and were therefore classified as a desirable feature within a 5 minute walk.

Parkhouse’s unique recommendation to increase access by creating multiple pocket gardens could also be applied to site selection criteria by increasing the range of size requirements for the potential sites. Lastly, due to negative feedback from Quinn, Epstein, and Parkhouse, access to parking was omitted from site selection considerations.

#### **5.2.6 Distance from Major Roads and Rail Corridors (30m away)**

Interestingly, the five participants commenting on distance from major roads were opposed to using a buffer around roads as a criterion for site selection. Since the focus of the inventory was on community gardens, not for commercial production, Davis’s comment was omitted from this content analysis (Table 14).

**Table 14:** Distance from Major Roads Evaluation Matrix

Distance from major roads and rail corridor (30m away)	Response		
	Yes	No	NC
Group 1: City Planners	0	3	0
Group 2: Community Leaders	0	1	5
Group 3: Urban Producers	0	1	1
<b>Total</b>	<b>0</b>	<b>5</b>	<b>6</b>

#### Summary of Distance from Major Roads

Most of the discussion concerning the distance from major roads questioned the classification of major roads, the potential for pollution, and if railway corridors were still actively used in Victoria. Furthermore, and in contrast to the criterion, interviewees sought sites in proximity to major roads to increased visibility and access, and to ensure boulevards were included in the inventory. Though interviewees' responses could have been interpreted and reconfigured into a new criterion in support of locating sites 'in proximity to major roads', they were accounted for in Section 5.2.7's discussion of missing criteria.

Following Leval's recommendations, the definition of major roads and the volume of traffic on roads classified as arterial and secondary arterial were examined. Major roads were classified in the Official Community Plan as "streets in urban areas that are multimodal in nature and fall under the conventional functional classes of arterial and collector streets" (City of Victoria, 2012b, p.258). While the OCP's definition of major roads did not appear to be a function of the volume of traffic, the City of Victoria's daily traffic volume ranges indicated arterials are greater than 18,000 vehicles per day and secondary arterials range from 5,000-20,000 per day (City of Victoria, 2012c).

The City of Victoria's Engineering department also published a map indicating the arterial and secondary arterial volume counts from 1975-2011. The volume count was markedly lower than the OCPs, with arterials around 10,000 per day and secondary arterials around 6,000 per day (City of Victoria, 2011b). The discrepancies between the daily traffic volume and the actual counts on the map have demonstrated the classification of roads in Victoria's OCP were not a function of the volume of traffic.

Leval's recommendation to measure "roads that carry 'x' thousand vehicles a day" was for the purpose of defining an acceptable range of the number of vehicles per

day which would influence the pollution potential in proximity to major roads. Since examining the volume of vehicles per day associated with road classification has proven inconclusive, distance from major roads was not discounted or included based on this factor.

*Pollution potential in proximity to major roads*

Some interviewees questioned the lack of information and studies available regarding the pollution potential associated with major roads, while others did not think there was substantial evidence to warrant a buffer distance away from roads. An inquiry into the potential pollution from major roads suggested atmospheric deposition and runoff exhibited an increase in heavy metals and polycyclic aromatic hydrocarbons (PAHs) (Archbold & Goldacker, 2011, p. 44). An example of such was a study of three different cities by Pouyat et. al. (2008) who observed an increase in the levels of lead and copper, compared to the naturally occurring levels in soil, at sites close to roads with higher traffic volumes and road densities (p.15). In Victoria, as noted during question development for 'Soils'(5.2.1), McLeod's research into the potential for atmospheric contamination of produce grown in Victoria revealed a high level of contaminants present. McLeod also found that the higher the traffic density in urban areas resulted in greater traffic emissions, levels of atmospheric pollution and heavy metal deposition (lead, cadmium, manganese and zinc) (2011, p.102). Although some interviewees dismissed the potential for pollution associated with major roads in favour of site specific assessments, a literature review by the City of Toronto's Department of Public Health comparing five studies on soil contamination due to transportation has defined a 30 meter buffer as "adequate to protect urban gardens from deposition and accumulation of major traffic emissions" (Archbold & Goldacker, 2011, p. 44-45, Pouyat et. al. 2008).

Despite strong evidence indicating an increased incidence of soil contamination adjacent to major roads, prescribing a standard distance from major roads to ensure soil exposure to harmful levels of contaminants is problematic due to the inconsistency of the urban environment's landscape. Pouyat et al.'s study acknowledged the challenge of quantifying urban gradients because of the "...patchiness of urban development patterns, distance may not be as representative of an urban gradient as a quantifiable metric such

as a road or population density” (Pouyat et. al., 2008, p.2). For although a road is a quantifiable feature of the landscape, the local topography and climate influencing the site conditions vary from one location to the next. This coincides with the suggestion avoid having a ‘blanket’ approach to assessing sites beside major roads because conditions may vary significantly between them. Sites in proximity to major roads should require additional consideration during site visits.

### *Rail Corridors*

In terms of rail corridors, Victoria hosts the starting point of Vancouver Island’s E&N railway. Upon investigating the status of railway, Boyd’s remarks have proven correct, as rail operations in Victoria shut down during the course of this study in March of 2011 (Holmen, 2011). Since both passenger and freight activities have ceased, creating a buffer away from rail corridors was unnecessary.

### *Questioning the Question*

It was important to note that four participants questioned if the criterion ‘distance from major roads and rail corridor (30m away)’ was for a best practice in terms of particulate levels and pollution, or because of accessibility within 30 meters. As the interviewer, my reply to each participant strived for neutrality by advocating for both within 30 meters and outside of 30 meters, granting participants the opportunity to express their stance without presenting the advantages of a single side. Sites within 30 meters major roads were presented as valued for their access, while the rationale for situating sites 30 meters away from major roads drew from the outline in the question development section and acknowledged the potential pollution from large volumes of traffic, site safety and the unknown effects of pollution in proximity to major roads or rail corridors. Although researcher bias was present in the advantages offered, it provided a basis for further discussion in the context of the research.

### **5.2.7 Question 1 a) & b): Is anything important missing?**

Though participants were asked if anything important was missing in terms of primary (a) and secondary (b) criteria, the majority of their responses addressed the proposed primary and secondary criteria, consulted the supplemental Attribute Table, and did not specify if their recommendations should be primary or secondary criterion, but discussed missing criteria in general. The only interviewee to distinguish between primary and secondary criteria was Markgraf.

Missing criteria were evaluated differently than the primary and secondary criteria, whereby all the unique recommendations were included in the evaluation matrix in Table 15, even if there was only one participant commenting. The evaluation matrix was also arranged hierarchically, from most frequent responses at the top to the least responses at the bottom. The most positive frequent responses considered factors influencing sunlight, safe location, community involvement, proximity to density users, public input and identifying community assets, and proximity to schools, community centres, or churches.

Drawing from the Attribute Table (Table B1), a total of seven participants selected attributes they believed should be included for consideration as criteria. The attributes recommended were: tree canopy cover, presence of a building; proximity to other UA and green space, safe location, and proximity to density or proximity to density users.

Participants also suggested new criteria to consider, including cedar trees, pollinators, wildlife issues and fencing, proximity to schools and churches, multi-use on site, public input and identifying community assets, community involvement and support, as well as heritage buildings.

The criteria of proximity to community centres, schools, churches and community involvement and support, were examined further and discussed in response to Question 3 (5.4) because they were considered amongst the most important criteria. In addition, identifying community assets was amalgamated into consideration with ‘proximity to community centres, schools and churches’, as they provide similar resources for maintaining and supporting community gardens. Considering the multi-use of a site by locating it within proximity to community centres was also addressed.

**Table 15:** Evaluation Matrix of Missing Criteria Suggested by Interviewees.

Missing Criteria		Group 1			Group 2			Group 3			TOTAL		
		Yes	No	NC	Yes	No	NC	Yes	No	NC	Yes	No	NC
1	Sunlight (tree canopy cover, buildings)	1	0	3	2	0	4	1	0	1	4	0	8
2	Safe location	1	0	3	3	0	3	0	0	2	4	0	8
3	Community involvement and support	2	0	2	1	0	5	0	0	2	3	0	9
4	Proximity to density users	2	0	2	1	0	5	0	0	2	3	0	9
5	Public input and identifying community assets	0	0	4	2	0	4	0	0	2	2	0	10
6	Proximity to schools, community centres or churches	1	0	3	1	0	5	0	0	2	2	0	10
7	Heritage Designation	1	0	3	0	0	6	0	0	2	1	0	11
8	Multi-use	0	0	4	1	0	5	0	0	2	1	0	11
9	Cedar trees	0	0	4	0	0	6	1		1	1	0	11
10	Pollinators	0	0	4	1	0	5	0	0	2	1	0	11
11	Proximity to existing UA and green space	0	2	2	1	0	5	0	0	2	1	2	9
12	Wildlife issues and fencing	0	0	4	0	2	4	1	0	1	1	2	9

### *Safe Location*

A debate emerged concerning the perceived safety of a location, and whether it was more important to seek out a safe location or to rehabilitate an unsafe location. However, the key question remained: what qualities make up an ‘unsafe’ location? Judging by the participant’s responses, homelessness, drug use, vandalism and dumping were issues existing community gardens and prospective sites were facing. From an urban planning perspective, these issues occur when land has fallen into neglect, such as an abandoned lot or house, or it was being underutilized, such as a park. Whether a site was neglected or underutilized, safe or unsafe, re-purposing the land for a community garden provides a solution by engaging the surrounding community and promoting land stewardship.

### *Proximity to Density Users*

Interviewees associated the demand for community gardens in areas with high population densities. They believed demand was located with apartments, condos,



community housing, and senior living centres and such housing was equated with individuals of low income. While interviewees were interested in determining the neighbourhood income level with the objective of targeting low income populations, such information was unavailable from Statistics Canada as the most detailed records focused on the CMA of Victoria.

Though Victoria has a high population density compared with Portland, Vancouver and Nanaimo (3.4, Table 6), evaluating proximity to density users relied upon using OCP's Urban Place Designation of Core Residential, Core Songhees and Urban Residential because they accounted for multi-unit residential land use and reflected actual population densities.

#### *Public Input*

Although Markgraf's suggestion to include public input was not accommodated during this study, public input and consultation would be required if proposed sites were pursued. Therefore, it was with the intention of focusing on physical criteria for the inventory, and introducing social attributes for consideration in the future, that public input was excluded.

#### *Heritage Designations*

Leval's concerns over the limitations of heritage designations were well-founded, as parcels of land with a heritage designation have formal protection from the City and cannot be demolished or altered without City Council and the HCA's approval (City of Victoria, 2012). Of particular interest were the 13 Heritage Conservation Areas which entailed regulatory guidelines for each area and property, and presented a logistical challenge when trying to access land for community gardens. These areas should be further explored during the GIS analysis.

#### *Cedar Trees*

Though the extent of influence cedar trees have on the growing conditions of plants in proximity was inconclusive, the presence of cedar trees should be noted with regards to tree canopy cover and factors affecting sunlight as a negative site attribute.

### *Pollinators*

Following Epstein's suggestion to consider supporting pollinator habitat, the state of pollinators on Vancouver Island was investigated. Based on local research, the number of honey bees on Vancouver Island have been declining as a result of loss of natural habitat, new diseases, pests like mites, and poisoning from pesticides and herbicides (Hutchings, 2010). Fortunately, native bees like the blue orchard mason bee are resistant to many of the new diseases and mite problems that honey bees face. They are also effective pollinators, pollinating up to sixty-five percent as many flowers as honeybees. By coinciding a community garden with existing habitat; such as natural areas, park space, or backyards; or preserving habitat on site, native bees have the potential to increase food production and ecosystem health (LifeCycles Project Society (a), n.d.). The Spring Ridge Commons and James Bay Community Gardens are examples of community gardens in Victoria with bee gardens and bee friendly plants on site. Though detecting the presence of pollinators was not conducive to a GIS analysis or evident during site visits, habitat for pollinators was considered by examining the adjacent land use for vegetation.

### *Fencing*

The tension between using fencing to protect against wildlife and vandalism, while not isolating or privatizing a site from the public, was difficult to mediate. For although sites near the urban core would be susceptible to vandalism, sites near the edge of Victoria were equally at risk of destruction from foraging deer, making the presence of fencing a greater structural advantage despite the aesthetic and disadvantages.

### *Proximity to Urban Agriculture and Green Space*

An interesting debate also emerged between locating sites in proximity to urban agriculture and green space compared to having them dispersed throughout each community. Participant's supporting sites in proximity to urban agriculture and green space believed they would enhance access to the network of community gardens, increase connectivity and plant diversity, and provide shared resources such as storage. Despite an interviewee's reservations that neighbourhoods with an existing community garden

would be excluded, such areas exhibit support for community gardens and the potential demand for more community gardening space.

### **5.3 Question 2: Size Classification**

The objective of Question 2 was to determine a suitable size range for commons and allotment gardens in Victoria using Kaethler's size classifications from the Vancouver UALI. However, during the interviews I did not re-iterate this objective, but asked if the size classes were generally suitable for the City of Victoria. Although the responses were not specific to the objective of the study, it allowed participants to freely consider the potential of all the categories along with their land uses and size ranges, as Kaethler's table presented a broad range of potential types of urban agriculture under each size class.

The responses were analysed and discussed according to the four size classification categories (Table 7) because most participants responded with general feedback according to the size class. Though participants did not critique the actual size range or units of measure, they inquired about the metrics of various categories in order to make it relatable to their preferred unit of measure. This may have impacted their perception of the how small or large a category's range was depending on the participant's familiarity with hectare and square meter units of measure. While the responses were still summarized as positive, negative, or no response, a content analysis was not performed in favour of reviewing participants' suggestions for community gardens.

Only 11 of the 12 participants chose to respond to this question. Interviewees commenting expressed an interest in large size parcels of land and plots, but also including smaller sites to fit within the community. They were also interested in sites with impervious surfaces or poor soils for container gardens, and suggested eliminating size class ranges overall in favour of minimum thresholds for community gardens.

#### **5.3.1 Large Scale Growing Operations**

Large scale growing operations were discussed by 7 participants, with 3 in opposition, and 4 in support. Large scale sites were discussed in terms of efficiency of production and cost of land, as well as activities on site including multi-use.

The participants in opposition to large scale operations believed the scale would be difficult to apply due to the lack of large tracts of land available in Victoria and the inefficiencies of production and cost of land use. City planners believed there was also a lack of public interest or demand for large scale growing operations. Without the pressure of an impending food shortage to seek out large scale plots, some interviewees' believed the present context would require a "major shift in thinking" (Boyd) for such scale to be pursued.

In contrast, the participants in support of large scale growing operations were mainly from Group 2, and believed large scale operations could be applied in Victoria with the multi-use of different activities occurring on-site. Although the responses to large scale growing operations classes were divided, large pieces of land were of interest to most participants and would be considered during the inventory.

### **5.3.2 Small Scale Growing Operations**

There were 7 participants in support of small scale growing operations, representing members from each Group in the discussion, with 3 participants from both Group 1's City planners and Group 2's community leaders, and 1 from Group 3's urban producers. Recommendations included supporting smaller spaces and consider the multi-use of a site. Reviewing Kinnis's description of her small scale operations as 1,000-1,500 ft<sup>2</sup>, it equated to approximately 305-457 m<sup>2</sup> in size, and fitted within the 92-1,000 m size class range presented. If commercial small scale growing operations such as Kinnis's were pursued in an UALI, residential and public land, as well as the Home Occupation Bylaw, should be considered.

### **5.3.3 Community Gardens**

Of the 8 interviewees who supported the community garden size class, 5 expressed an interest in determining the minimum size, the number of plots, and the average size of a community garden in Victoria. Ascertaining the minimum size for a community garden would be difficult because each garden was the product of the community it resided in and served. However, surveying the existing allotment and commons gardens to determine the size of each garden, and the size and number of plots, provided insight into what an acceptable scale range would be in Victoria. It also

established the minimum, average, and the maximum size of community gardens (Section 6.2.8).

Overall, participants suggested that the size range for community gardens could be smaller. Participants also debated if the size ranges between allotment and commons gardens differed and believed commons would require a smaller amount of space than an allotment. Commons gardens in Victoria are smaller in size because they require less infrastructure and could be integrated into existing parks and natural areas.

Since community gardens were the focus of this study, it was important to determine if a size class was applicable to site selection. Interestingly, as seen with the responses to large scale growing operations, a few participants were against using a prescribed size class in favour of observing what was appropriate for a particular site. However, most participants were interested in determining an acceptable size range and number of plots for community gardens. While the analysis helped to determine an acceptable size range, it also aimed to provide a threshold from which smaller sites, which might not sustain a community garden, would be eliminated.

#### **5.3.4 Growing on Impervious Surfaces or Poor Soils**

Seven participants exhibited interest and support for various models of growing on impervious surfaces or poor soils. Container gardens were considered for impervious surfaces such as parking lots, or poor soils which might be contaminated. Since container gardens were similar to the allotment style of gardening; impervious surfaces and poor soils should be identified in the GIS analysis as potential land for community gardens.

#### **5.3.5 Highlights of Group Responses to Size Classifications**

Overall, the most positive feedback from participants was for the community gardens' style of allotment gardens, with eight participants in agreement. This was due to the discussion generated from Question 1, as allotment and commons gardens were emphasized as the focus of the study. As a result, participants were more likely to build upon the previously discussed points and respond within the context of the study.

Growing on impervious surfaces or poor soils and small scale growing operations also garnered positive responses, as each had six participants agreeing with their size class. The most debated category was the large scale growing operations because of the

desire to have large sites conflicted with the lack of support and lack of large sites available.

Additional discussion concerning size classification did not emerge with respect to a single class, but concerned the dynamics of implementing a size class for site selection. Some interviewees felt that using size class as a criterion was not applicable, as was limiting and it depended on the model of urban agriculture being pursued. In contrast, a few interviewees suggested correlating the size of a site to the demand, population density, or proximity to service nodes.

Lastly, Parkhouse believed that small spaces should be considered, and believed that small spaces were more sustainable and fit in better with their surroundings. She also suggested that smaller allotment gardens in residential areas would be more acceptable if the community was opposed to a large allotment garden.

#### **5.4 Question 3: Most Important Criteria when Selecting a Site**

Participants were asked what the most important criteria were when selecting a site to draw out their individual perspectives and opinions, and to ensure that priority criteria were identified. When analysing responses, participants often had an initial response, and ‘negotiated’ a second response to be considered. Though participant’s initial reactions were taken as the most important, their afterthoughts were also included for consideration.

By performing a content analysis of the initial and secondary responses *en masse*, the most important criteria to be considered were soil, water, sun, community support, proximity to density users, land use and services. The content analysis of their responses was detailed in Table 16 by criteria and each Group’s positive response. Though most of the criteria were discussed in previous sections, points not discussed in the context of most important criteria were examined.

**Table 16:** Content Analysis of Most Important Criteria.

Most Important Criteria Identified	Group and Number of Positive Responses			
	Group 1: City Planners	Group 2: Community Leaders	Group 3: Urban Producers	TOTAL
Water	2	3	1	6
Soil	1	3	1	5
Sun	1	1	1	3
Community support	3	1	0	4
Proximity to density users	1	3	0	4
Land Use	1	2	0	3
Services on site	0	2	0	2

#### 5.4.1 Summary of Most Important Criteria

Overall, it was difficult for participants to single out the most important criteria to be considered. When summarizing the responses based on the content analysis, it was clear that the basic biophysical package of soil, sun, and water; community support; and proximity to density users were the most important criteria to interviewees. Though land use and services on site were both stated, they had fewer responses.

The content analysis also granted insight into what the Groups identified as priority criteria. Of note was Group 1's City planners concern with the presence of community support, which may have been due to the Community Gardens Policy requirements. Although identifying areas with community support was the most important criteria for Group 1, it was difficult to quantify without conducting formal surveys throughout neighbourhoods in Victoria.

Group 2's educators, non-profits and community groups were most concerned with proximity to density users, possibly because individuals from Group 2 were looking for community based assets, whereas Group 3 focused on physical criteria as they were urban producers. While the criteria addressed in previous sections were soil, water, and land use; the criteria of proximity to density users and sunlight were discussed further in response to Question 4's most important criteria in terms of food security (Section 5.5.1).

## 5.5 Question 4: Most Important Site Selection Criteria in terms of Food Security

Similar to the analysis of Question 3, the most important site criteria were identified through a content analysis of the most frequently occurring positive statements. The results of the content analysis are listed in Table 17, with co-location with low income population, and accessibility as the most frequently cited criteria.

**Table 17:** Content Analysis of the Most Important Site Selection Criteria in Terms of Food Security.

Most Important Criteria in Terms of Food Security	Group and Number of Positive Responses			
	Group 1: City Planners	Group 2: Community Leaders	Group 3: Urban Producers	TOTAL
Co-location with low income population	1	3	0	4
Accessibility	2	2	0	4
Proximity to community hub or prominent location	2	1	0	3
Larger size of land and plots	0	1	1	2
Sun	0	0	1	1
Soil	0	0	1	1

### 5.5.1 Summary of Most Important Criteria in terms of Food Security

Comparing the participants' responses to Question 3, all but 2 participants changed their answer, with Group 3's Kinnis and Kay remaining in support of physical criteria. The shift in response from a majority of participants appeared to be due to their careful deliberation of the notion of food security, and a sense of urgency it evoked. This resulted in more elaborate responses as the interviewees pushed beyond basic site criteria and broadened the discussion into planning what characteristics community gardens functioning in support of food security should have. For example, the biophysical package covered the basic necessities for growing food on site, while the latter discussion concerned what was being grown and replanted, and if it was nutritious, market and climate change resistant. Desirable site characteristics associated with food security were also identified as: production capacity, utilizing the site as an educational tool, growing for profit and commercial enterprises, and questioning what would be grown on site.

The notion of food security also instigated a sense of urgency to maximize the effectiveness and sustainability of a site in terms of social, environmental and economic



factors. As such, when participants considered food security as part of the most important criteria, they were interested in seeking larger pieces of land and plots, as well as increasing accessibility and the opportunity for education at a community garden. The interest in educating the public was interpreted into the criterion of ‘proximity to a community hub’, such as a school or community centre, and ‘proximity to a prominent location’ such as a major road or a site with high visibility.

Accessibility was also addressed by considering ‘proximity to a community hub’, as well as ‘proximity to density users’. As discussed in section 5.2.7, high population densities represented apartment or condo dwellers, community housing, senior living centres, and were equated with individuals of low income. Although low income populations and food insecure groups were considered because they would benefit the most from increased access to food production space, information locating and highlighting such areas in Victoria was unavailable from Statistics Canada (5.2.7).

In contrast, Davis argued that low income groups may have limited time to participate in community gardens as he felt required a lot of time and work. While Parkhouse and Schwartzentruber favoured increasing access for low income groups, they also supported increasing access to food production space for *everyone* and believed targeting areas with a high population would satisfy as a criterion.

## **5.6 Question 5: Barriers to Allotting Land for Urban Agriculture**

The most frequently discussed barriers to allotting land to urban agriculture were: negative perceptions of urban agriculture, community opposition or lack of community support, the politics of City Council and staff support, the awareness and interpretation of City policy, the amount of work required, finding a responsible party for the site, the costs associated with community gardens, the availability of land and competing land uses. The most frequently occurring barriers were highlighted as core barriers, with subsections and the subsequent discussion organized to incorporate related barriers. Topics outside of the primary barriers were classified as outliers. They represented unique or individual opinions which did not adhere to the discussion of the core barriers.

### **5.6.1 Perceptions of Urban Agriculture**

A majority of the interview participants considered the perceptions and aesthetics of urban agriculture as barriers because they believed the public does not understand or approve of the appearance, and as a result, does not consider growing food in the city an acceptable activity. The public's apprehension towards allowing urban agriculture was believed to be a consequence of the anticipated appearance, such as messy, neglected or fenced sites; the processes accompanying it, and breaching the overall aesthetic standards for city land.

Interviewees also believed an individual's sense of personal security was threatened by allotting land to urban agriculture because it represented a physical and visual change in the landscape. Therefore any change, whether positive or negative, was resisted. This was observed when discussing allotting City land, especially park land, because it was seen not only as a change in the landscape, but as privatizing public space.

Participants also felt strongly that there was a lack of awareness concerning the various benefits and roles urban agriculture fulfilled and contributed to a community's well-being. The lack of awareness was attributed to the difficulty of quantifying or overlooking the offshoot benefits. This lack of awareness was also perceived as a systemic issue amongst government and non-profit agencies because urban agriculture was compartmentalized into one type of land use with one observed benefit: food production.

### **5.6.2 Community Opposition or the Lack of Community Support**

Community opposition or a lack of community support was identified by 5 interviewees as barriers to allotting land to community gardens. Moreover, Group 2's community leaders demonstrated how a small amount of community opposition presented a barrier to allotting land to community gardens because a few individuals had the influence and power to terminate a project.

As a City employee, Boyd stated that there was both "opposition and support for absolutely every project we do". From a playground, which one would assume was easy to establish, to an off-leash dog area or a community garden, Boyd believed it was about just trying to find the balance. Similar to Boyd's remark, Rankin stated that there would

always be opposition to moving forward and supported finding a balance between individuals for and against a given project.

### **5.6.3 Politics of City Council and Staff Support**

Allocating land to community gardens was described by interviewees as a political process dependent upon getting community support and approval from the current City Council. If there was not full support from the residing community, a proposed garden was subject to the political climate and decision of the City Council. This presented a barrier because some interviewees felt the current City Council lacked the political will to advocate for change or endorse community gardens. Though interviewees felt the City Council was not actively pursuing community gardens, City Council should not be forcing community gardens upon a neighbourhood unwilling to support them.

Interviewees also believed some City staff presented a barrier because they were indecisive or held conservative views regarding community gardens in Victoria. This was problematic because City staff was often employed longer than City Council members' three year term and had the potential to influence the allocation of land to community gardens over the longer term. Furthermore, interviewees part of Group 2 and 3, community leaders and urban producers, felt that not having connections with either City staff or a City Council member was a barrier.

### **5.6.4 Awareness and Interpretation of City Policy**

The lack of awareness and multifaceted interpretations of the City of Victoria's urban agriculture policies presented a significant barrier to allotting land to urban agriculture because they encumbered and prolonged the process and edification of groups and individual's seeking to participate in urban agriculture.

### **5.6.5 Who is going to take care of it?**

The majority of the interviewees believed finding an organization to assume responsibility for managing a site was a barrier to allotting land for urban agriculture. They believed the barriers associated with site management were: the requirement of a non-profit to assume the costs of liability and insurance for community gardens, the lack of a central organization to oversee community gardens, and the lack of a government

led-initiative to allot land to urban agriculture. The absence of a central organization responsible for community gardens throughout Victoria was perceived as due to a lack of funding for an organization to support and maintain a network of community gardens. When examining the issue of responsibility as a whole, the financial responsibilities involved with looking after a site appeared to be the main reason for avoiding responsibility.

#### **5.6.6 Costs Associated with Community Gardens**

The costs associated with community gardens presented a barrier to allotting land to urban agriculture because the City of Victoria, non-profit associations and private individuals did not want to accept the costs, there was limited funding available for community gardens, the cost of land was high, and the cost of a failed garden was difficult for the City to accommodate, as well as different mandates and limited budgets at various levels of the government,.

#### **5.6.7 Availability of Land**

This section discusses participant's perspectives on the limited availability and competing demands of land use in Victoria, both of which were seen as presenting barriers to allotting land to urban agriculture. This section also highlights the challenge of contending with the dog walkers' interest group and how the type and length of tenure affects the availability of land.

In terms of land availability, some interviewees believed Victoria was built up and had a very limited potential land base. Boyd believed it was difficult to find suitable space inside the city because Victoria was a mature city with defined boundaries, a dense population, and lacked the park space to meet everybody's needs. Similarly, Davis believed the competition for green space was a barrier because there were a lot of desires interested in how green space gets used, such as conservation, active parks, and affordable housing.

With regards to densification, Leval stated that Victoria was growing at a huge rate, but believed it was all redevelopment, infill, and intensification. He believed this did not leave the option to set aside land for a community garden because they presented a competing land use amongst other demands, such as providing walkable communities or

preserving green space. Leval also stated that community gardens were competing against recreational interests and open space because. Overall, Leval believed the biggest barriers to allotting land to urban agriculture were: the high land value, the densification of the city to provide a more complete range of services and amenities, and the competing demands on open space, existing, and future parks.

### **5.6.8 Outliers**

The identification of a single or unique barrier, deviating from/outside of the context of the previously discussed core barriers and emergent themes, was considered an outlier in this study. The barriers classified as outliers were listed below, and outliers requiring further explanation were elaborated upon in a discussion. The barriers identified as outliers and the participants identifying them were:

- Criteria were barriers (Parkhouse)
- Small capacity sites were perceived as ‘building a waitlist’ (Parkhouse)
- Garry Oak Ecosystem (Markgraf & Kay)
- Proximity to Riparian Zone (Epstein)
- Social Isolation (Epstein)
- Lack of Understanding of Importance of Urban Agriculture (Kay)
- Lack of Education and Training (Lydon)
- Lack of Innovation or Too Innovative Approach (Lydon)

### **5.6.9 Summary**

The most prevalent barrier interviewees identified was the conflicting perceptions of urban agriculture among community members, gardeners, City Council and staff, as well as government and non-profit organizations. Their conflicting perceptions of urban agriculture were attributed to a lack of understanding the appearance, aesthetics, or benefits of urban agriculture, the belief it was privatizing public space, such as park land; an individual’s resistance to change, and the compartmentalization of urban agriculture amongst public and private institutions. Such perceptions of urban agriculture were significant barriers to obtaining land because they influenced the acceptance, prioritization and the value of urban agriculture as a land use.

The issue of misperception was also observed in the lack of awareness and difficulty interpreting the City of Victoria's urban agriculture policies. For without knowing of, or understanding the current policies, the process of obtaining land for urban agriculture was impeded or suspended.

With regards to the perception of community gardens, it became evident that any amount of opposition, or simply the presence of an opposition, had greater influence than any support for a community garden. For if the debate over a proposed community garden was brought to the political level, interviewees stated the City Council rejected the garden if there was any hint of opposition from the community. Although the City Council has the final decision, the community's support or opposition for a garden had a significant influence over the allocation of land and creation of a community garden.

Interviewees also suggested romanticizing and underestimating the amount of work required for community gardens were barriers because interested individuals would undertake tasks greater than they had anticipated or were able to manage. Consequently, if participants were unable to keep up with the maintenance community gardens required a site could fall into neglect. Though interviewees believed participants with a plot in an allotment garden were less likely to abandon or default on their commitment, they felt volunteers participating in commons gardens were less dependable because their involvement came at a personal cost of time and money. The success of continued participation in allotment gardens was largely attributed to the direct and personalized benefit to gardeners working their plot.

To further ensure land allotted to a community garden was maintained, interviewees felt it was important to find a group responsible for the overall management of the site, and to assume liability and the cost of insurance. Their belief was reflective of the Community Gardens Policy's repeated advocacy for community gardens to be affiliated with a non-profit to assume responsibility. However, interviewees felt that the City's suggestion for a community garden to be affiliated with a non-profit presented a barrier to acquiring land because without the support of a non-profit, sites were less likely to gain approval from the residing community or City. Similar bureaucracy was thought to be attached to school land, requiring a group to be responsible for maintaining the site.

Securing the support of a non-profit and access to land was thought to be a slow and daunting process for individuals to navigate because it was hindered by the lack of a central organization responsible for the network of community gardens or a formal process for allotting land to urban agriculture. Furthermore, establishing a central organization to oversee a community garden network was thought to be a challenge because the development and monitoring of a network required funding, and interviewees believed most grants were focused on goal-oriented projects rather than supporting a system.

Additional costs associated with community gardens included a lack of funding, the cost of start-up, the price of land and the cost of restoring a failed garden. The interviewees stated that such costs were significant barriers to acquiring land because the City of Victoria did not want to assume the financial responsibility for a garden, while non-profit groups did not have the resources, and individuals could not afford the time or money to manage a garden.

Consequently, the cost of land, the lack of space, the inability to secure timely tenure, and the competing demands for land use, were limiting factors for the availability of land. In particular, securing tenure on private land presented a barrier because private land was thought to be more unstable and inaccessible compared to public or institutional land. As for competing demands on land use, dog walkers were perceived as a controversial interest group to contend with for land.

### **5.7 Question 6: Supports to Allotting Land for Urban Agriculture**

During the interviews, most of the supports were discussed simultaneously with barriers. Therefore some of the discussion of supports featured in this analysis addresses the aforementioned barriers and offers resolutions. For instance, the following supports were core themes and addressed the aforementioned barriers: the awareness and perception of urban agriculture, education, outreach, and advocacy groups, community support, neighbourhood associations, the City of Victoria, and financial supports through healthcare spending and grants, as well as innovative design which was an outlier. The contribution of resources was also identified as a core theme because it was among the most frequently discussed supports.

### **5.7.1 Awareness and Perception of Urban Agriculture**

Interviewees believed there was a general enjoyment of gardening by people in Victoria who engaged in gardening as a leisure activity. Within this ‘culture of gardening’, Kay believed people were starting to think about growing their own food because there is a greater understanding of the benefits of urban agriculture. Some of the multiple benefits interviewees identified were that urban agriculture provided opportunities for a healthy lifestyle through recreation, supplementing nutrition, social and psychosocial benefits.

The idea of growing in the city, as well as the taste associated with growing one’s own food, were also perceived as supports for urban agriculture because they re-enforced the connection between the different processes of selling, growing, and harvesting, worked holistically together with smaller garden operations to support urban agriculture.

Drawing from Kinnis’s experiences SPIN farming, the awareness concerning food security, including buying local and the desire for organic agriculture, were significant supports for urban agriculture. She also praised her clients for being a progressive group of homeowners, Kinnis believed the amount of attention food security issues and urban agriculture were getting made “homeowners prepared to give up their land for something like this”. She described her business as “riding on the backs” of this wave and did not think she could have made a living growing food in the city 10 years ago because there was not the same level of awareness concerning food issues.

Many other interview participants believed the support in public opinion for food security initiatives in an urban setting been the most significant supports for urban agriculture.

### **5.7.2 Education, Outreach and Advocacy Groups**

Groups advocating for urban agriculture and providing an educational component to public outreach were identified as an existing, yet essential. Markgraf suggested conducting outreach and providing educational opportunities for the neighbourhood supported allotting land to urban agriculture because it helped to overcome the barriers associated with the perception of urban agriculture and community opposition. She believed that engaging different groups and working towards public education was



important because “a lot of people go automatically to whatever fear”, such as taking away recreational opportunities or changing the community’s aesthetics.

A few interviewees also recognized the importance of organizations such as LifeCycles, CR-FAIR, and the Greater Victoria Compost Education Centre providing advocacy and support for allocating land to urban agriculture. Interviewees believed advocacy groups were supporting urban agriculture simply by consistently advocating for it.

Community groups were also recognized for promoting urban agriculture, and new groups such as GTUF were an emerging source of support. As a coordinator for GTUF, Epstein believed it provided a community space for people in the neighbourhood to talk about food and food security. In addition to GTUF, Epstein noted the Hillside Urban Farmers for Sustainability (HUFFS), Vic West Urban Farmers, and Jubilee Urban Farmers, also served as “...neighbourhood based, network building, community building” initiatives.

Though the advocacy groups most interviewees discussed were from the community and regional level, Lydon also suggested “pressure groups” or national networks as supports for allotting land to urban agriculture.

### **5.7.3 Community Support**

Community support for urban agriculture was composed of the demand for access to gardening space, volunteer support, a shared community vision and the community’s support for the municipality. Though general support from the community was important, the demand for gardening space by the community was seen as a greater support. Interviewees believed the established community gardens were doing well, and the long waitlists demonstrated existing community support for allotting land to urban agriculture. Similarly, Davis stated that the active gardening groups and advocates demanding for access to gardening space indicated where the demand was coming from.

Davis also speculated that the demand for gardening space was the result of a demographic shift, whereby baby boomers that were once gardeners on their own property were moving in smaller accommodations such as condos and still wanted to participate in a garden. Furthermore, Davis identified immigrants and foreign students as part of the demand for gardening space and as an emerging support because they came

from countries with a stronger tradition of growing their own food than in Canada. He questioned that if such user groups traditionally had access to land for growing food, but were now living in an apartment in Victoria; would they now represent a demand for that type of service or experience.

Having volunteers support an urban agriculture project helped to maintain momentum and enthusiasm for the project. Volunteers and participation from the community re-energized a project, keeping it a fun and social activity.

Parkhouse believed community support for urban agriculture through a shared community vision helped to allot land to urban agriculture. For example, she emphasized that the community garden projects she undertook were the result of the ‘Vic West Visions Project’ which was initiated to “...to understand what the residents’ vision was for our neighbourhood” in the wake of increasing development. As a result, community gardening projects initiated in Victoria West stemmed from a shared community vision for community gardens and food security initiatives.

#### **5.7.4 Neighbourhood Associations**

Support from a neighbourhood association was important because of the administration, financial management, funding and resources it provided. Boyd also felt neighbourhood associations were most aware of what the community wanted, and despite this study focusing on mapping land capabilities, he believed starting a garden was ultimately the community’s decision. The support of a neighbourhood association was also recognized by Parkhouse as important because the Community Gardens Policy requires a community garden on public land to have a license with the city, and the neighbourhood associations typically held the licences and handled the legal documents. She believed there was generally more support a community garden affiliated with a neighbourhood association.

#### **5.7.5 City of Victoria**

Interviewees believed that the City of Victoria was supportive of allotting land to urban agriculture due to the number of community gardens throughout the City, the support of City Councillors and staff, and City policy such as the Urban Agriculture Resolution, Community Gardens Policy and OCP were identified. In addition, Parkhouse

believed having a relationship with city staff was a significant support to allotting land to urban agriculture, as it overcame the barrier of not having connections within the city (5.6.3).

#### **5.7.6 Contribution of Resources**

Neighbourhood associations, City of Victoria, local businesses, homeowners, philanthropists, academics, and institutions were identified as unique yet valuable resources in support of urban agriculture. Interviewees stated that the City of Victoria had provided leaf mulch, built footpaths for public access and paid for a community garden's water access. Local also business supported urban agriculture by donating materials, work space, labour and providing specialty services free of charge.

Individuals offering their land for SPIN farming operations like as City Harvest, or to LifeCycle's Sharing Backyards Program were also contributing resources to support urban agriculture. Epstein suggested a "philanthropy minded person" supported allotting land to urban agriculture, and gave the example of a property-owner that had allowed members of Transition Victoria's Capital Nut Tree Project group to prune, propagate, and harvest an overgrown hazelnut orchard covered by ivy.

As identified with Primary Criteria (5.2.3), Davis suggested using backyards or other private spaces in partnership with a non-profit or a company to engage land that was being underused. He believed that there were people who had land but did not have time to invest into caring for it, and yet still wanted to see it be used, providing an opportunity to support urban agriculture.

#### **5.7.7 Economic Conditions and Financial Supports**

The economic conditions influencing participation in urban agriculture were identified as a potential support, while financial supports were also identified. Interviewees felt that interest in urban agriculture fluctuated as a result of the economic times, and if the economy was booming again, participation would not be as prevalent. Coincidentally, Lydon believed poverty in Victoria was a potential support for allotting land to urban agriculture because people were trying to reduce personal costs. Envisioning more extreme scenarios, Schwartzentruber believed peak oil and economic collapse would be powerful supports for allotting land for urban agriculture.

Financial supports included existing grants from the City of Victoria or private businesses, and potential financial support through health care spending and disease oriented charities, such as the Canadian Cancer Society or Diabetes Association. Lydon believed that there were millions of dollars available if disease-oriented charities shifted their funding towards “what prevents disease” and primary healthcare to include as urban agriculture.

#### **5.7.8 Outliers**

Supports identified as outliers were listed below, and outliers requiring further explanation were discussed. The supports identified as outliers were:

- Innovative new urban design(Lydon)
- Individual advocates (Epstein)
- Climate change concerns(Schwartzentruber)
- Informal set-up of community groups and gardens (Epstein)
- Densification of the city (Davis)

#### **5.7.9 Summary**

Corresponding to the most frequently discussed barrier, interviewees identified the awareness and perception of urban agriculture as the most important support. The culture of gardening in Victoria; and an increased understanding of the benefits, a personal connection with food, and food security awareness, have all contributed to a greater appreciation and recognition of urban agriculture. The awareness of urban agriculture has also been supported through education and outreach, knowledge sharing, incubator programs and the provision of learning spaces. In turn, advocacy groups have supported education and outreach from the community level through to the national level.

Allotting land to urban agriculture was supported by the community’s demand for access to land, volunteer support for maintaining sites, and community visioning projects. Community participation and support for allotting land to urban agriculture was an important support because they would rally the neighbourhood associations and the City of Victoria to pursue their interests. With an understanding of the community’s vision for the neighbourhood, neighbourhood associations supported urban agriculture by providing administration, financial management, and holding site licenses.

Interviewees also indicated the City of Victoria was a source of support through councillors, staff, and City policy. Resources provided by the City of Victoria, as well as local businesses and individuals, were also identified as a significant support towards allotting land to urban agriculture. Resources included raw materials for building on site, labour, the contribution of land, current research and the ability to collaborate with research institutions.

The state of the economy also influenced support for urban agriculture, and interviewees implied poor economic conditions would increase participation. Regardless of economic conditions, interviewees also believed there was financial support for urban agriculture projects from private or public grants, health care spending, disease oriented groups or charities, and tax breaks.

### **5.8 Question 7: Mapping Existing Sites**

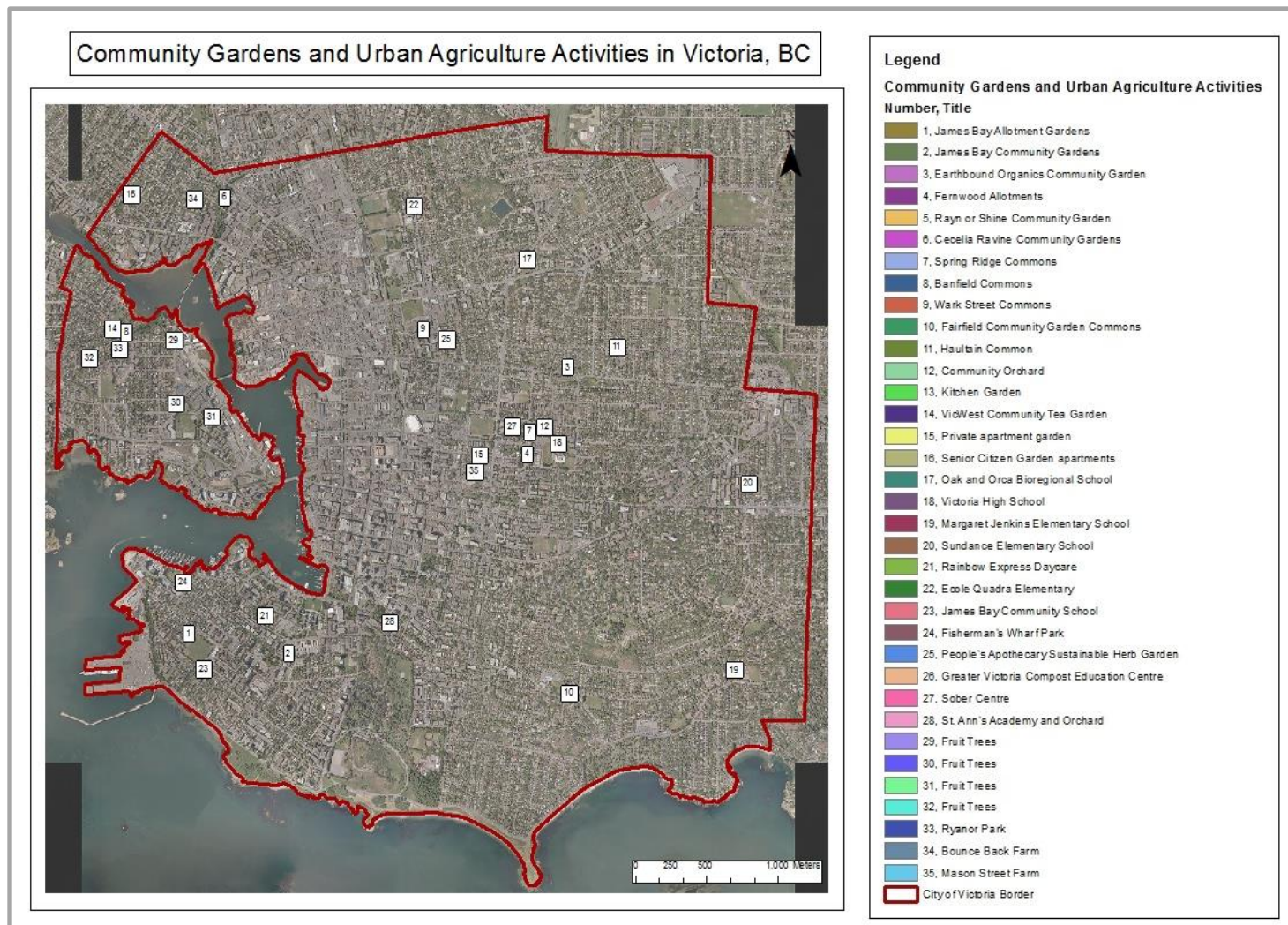
In addition to the allotment and commons gardens discussed in Chapter 2 (2.1.2), the interviewees identified existing urban agriculture activities throughout Victoria. The sites were digitized into a layer featured and are featured in Figure 14 to be considered during the UALI. The additional urban agriculture sites interviewees identified were:

- Fisherman's Wharf Park
- Vic West Community Tea Garden
- Evan Street Orchard
- Raynor Park's pear tree

Additional urban agriculture sites interviewees identified – *Continued*:

- School Gardens at James Bay Community School, Margaret Jenkins School, and Oak and Orca Bioregional School
- A sober centre's private allotment garden at Quadra and Bay Street

In addition to the existing sites, most interviewees made recommendations for potential sites to be included in the inventory. The site recommendations were consulted during the analysis and site selection.



**Figure 14:** Map detailing community gardens and existing urban agriculture sites throughout the City of Victoria.

## 5.9 Summary of Interview Results

### 5.9.1 Primary and Secondary Criteria

To determine the interviewee's most important site selection criteria a multi-criteria evaluation (MCE) was performed by consolidating the results from the content analysis into a table, and calculating the favourability of a criterion by weighing the positive statements against the negative. The content analysis of the interviews, from Questions 1, 3, and 4; rendered a total of 36 instances which interviewees could have stated their support for specific criteria. Although the likelihood of this occurring was marginal, it was important to recognize the primary and secondary criteria identified in the content analysis were a small proportion of the interviewees' recommendations.

The objective of performing a multi-criteria evaluation of all the criteria discussed was to determine the most frequently discussed criteria while considering all the perspectives, both positive and negative, and to allow primary and secondary criteria to emerge. This approach was inductive, as it examined specific opinions and perspectives reduced into general statements as criteria. For example, the content analysis from criteria concerning proximity to a community hub, prominent location, churches, community centre or community assets were consolidated into the single criterion class of ‘proximity to community hub, (prominent location, community centres or churches)’ because of the overlap between subjects. To incorporate all the sub-classes previously listed, and to simplify the analysis, the criterion was considered ‘proximity to community hub or community feature, such as a church, school, or community centre’. The criterion of services on site was consolidated into determining if there was water service on site.

The summary of the content analysis represented an importance value according to the interviewees’ interest and support of a criterion, which ranged from full support to the disapproval of a criterion. To distinguish what interviewees’ prioritized as primary and secondary criteria, the importance values were classified using natural breaks in the data as a guide. The results of the MCE are featured in Table 18, identifying 19 site selection criteria and a criteria hierarchy with 8 primary criteria, 8 secondary criteria, and 3 criteria excluded. The criteria excluded were wildlife issues and fencing, proximity to existing urban agriculture and green space, and distance from major roads and rail corridors.

**Table 18:** Multi-Criteria Evaluation of Interviewees' Proposed and Emergent Criteria

Criteria		Summary of Question 1 Content Analysis			Q3 and Q4 Positive Responses		Summary of Multi-Criteria Evaluation
		Yes	No	NC	Q3	Q4	
<b>Primary Criteria</b>							
1	Land use and type	12	0	0	3	0	15
2	Water availability (water mains)	7	0	5	6	0	13
3	Accessibility – walkability, visual access	6	1	5	0	4	9
4	Soil	7	5	0	5	1	8
5	Sun	4	0	9	3	1	8
6	Proximity to community hub (prominent location, community centres or churches)	5	0	0	0	3	8
7	Proximity to density users	3	0	9	4	0	7
8	Community Support	3	0	9	4	0	7
<b>Secondary Criteria</b>							
1	Not to include protected green space	7	3	2	0	0	4
2	Safe location	4	0	8	0	0	4
3	Co-location with low income population	0	0	0	0	4	4
4	Large size land and plots	0	0	0	0	2	2
5	Services on Site	0	0	0	2	0	2
6	Heritage Designation	1	0	11	0	0	1
7	Cedar trees	1	0	11	0	0	1
8	Pollinators	1	0	11	0	0	1
<b>Excluded Criteria</b>							
1	Wildlife issues and fencing	1	2	9	0	0	-1
2	Proximity to existing urban agriculture and green space	1	2	9	0	0	-1
3	Distance from major roads and rail corridor (30m away)	0	5	6	0	0	-5



### 5.9.2 Barriers and Supports

The core themes identified in the analysis of barriers and supports were represented in Table 19's chart. The following themes were identified as both barriers and supports, and were the most influential factors determining the allocation of land to urban agriculture:

**Table 19:** Core Themes identified in Barrier and Support Analysis.

Barriers	Supports
- Perceptions of Urban Agriculture	- Perception and Awareness of Urban Agriculture
- Community Opposition or Lack Of Support	- Community Support
- Politics of City Council and Staff Support	- City of Victoria
- Awareness and Interpretation of City Policy	- Education and Outreach
- Who is going to take care of it?	- Advocacy Groups
- Costs Associated with Community Gardens	- Neighbourhood Associations
- Availability of Land and Competing Land Use	- Economic Influences
	- Financial Support
	- Contribution of Resources

### 5.9.3 Potential Sources of Error

During recruitment, interviewees were sent a project outline, consent form to sign with questions they would be asked and an Attribute Table to review featured in Appendix Table B1. Many participants only briefly skimmed over the questions, and only a few actually read the Attribute Table before the interview. The lack of preparation did not impact the interviews too greatly, but some time was required to explain the questions rather than build off their previous knowledge of them. In addition, a copy of the questions and the Attribute Table were provided for the interviewee during the interview to refer to as needed.

The focus on allotment and commons gardens as the principle type of urban agriculture was not explicitly defined in the ethics application or the list of interview questions at the end. This was clarified during the interviews in order for participants to understand the scope of the study.

### Researcher Bias

The researcher bias must be acknowledged in the study objective, as the participant consent form clearly indicates the researcher's belief that urban agriculture can enhance food security. The bias therefore lies in advocacy, with the hope that it would succeed and in the utility the findings would provide (Stake, 2003).

During the interviews, participants would often ask what my program of study was. My response was that I am in the School of Environmental Studies and my supervisor was Dr. Valentin Schaefer, head of the Restoration of Natural Systems program. This was a potential source of bias as it brought up the concept of restoration for the participant to reflect upon; which they often included in their response later on. Although the topic of restoration came up organically, it was not initially stated by the participant and consequently must be acknowledged as a potential researcher bias; or causal inference, whereby the mention of it proceeded the response (Kelly & McGrath, 1988).

In terms of site selection, there was also participant bias, as their recommended sites focused more on the communities they lived in rather than a general overview of the City of Victoria. Hence a geographic bias was exhibited in their site recommendations.

## Chapter 6: Community Garden Land Inventory

Drawing from the findings of Chapter 5, the site selection criteria were finalized by analysing their application using satellite imagery and digital layers (6.1-6.2). The final site selection criteria were used to map potential sites in ArcGIS 10 (6.3). The main approach was to select sites in two steps: i) a detailed GIS analysis of primary criteria, followed by, ii) a visual confirmation using aerial satellite images and site visits.

### 6.1 Final Site Selection Criteria

The MCE of interviewees' recommended criteria from Table 18 were re-assessed in terms of their applicability for GIS analysis, and were divided again into primary and secondary criteria. The primary criteria were criteria which could be analysed in ArcGIS, while the secondary criteria could be documented during site visits.

Though the list of interviewees' recommended criteria was extensive, not all criteria were considered during site selection because they were: i) not compatible with GIS analysis, ii) difficult to evaluate during site visits, or iii) beyond the scope of this research. As a result, the criteria of community support and co-location to low income populations were omitted from the final GIS analysis, while the walkable catchment was demoted to a secondary criteria site visit. The final primary site selection criteria for the Victoria UALI's GIS analysis are presented in Table 20.

**Table 20:** Final Primary Site Selection Criteria for GIS Analysis.

	<b>Final Primary Site Selection Criteria</b>	<b>Characteristics Assessed</b>
<b>1</b>	<b>Land use and type</b>	public, institutional, industrial parks and school residential eliminated
<b>2</b>	<b>Water availability</b>	water mains and location of water service
<b>3</b>	<b>Proximity to density users</b>	proximity to Core Residential, Core Songhees, Urban Residential within 400 m walkable catchment
<b>4</b>	<b>Heritage designations</b>	designated sites were eliminated registered sites left in analysis
<b>5</b>	<b>Excluding protected green space</b>	Sensitive Ecosystem Inventory excluded

The secondary site selection criteria considered during site visits are shown in the Site Visit Form(A2) of Appendix A, documenting the present land use activities and adjacent land use, proximity to community hubs or prominent locations, walkable catchment, factors affecting sunlight such as buildings and tree canopy cover, and the presence of soil and surface conditions. The secondary criteria also included site features such as the presence of ecologically sensitive area (riparian zone, Garry oak), cedar trees, and pollinator habitat or vegetation nearby. A general impression of a site safety was also considered as absolute, potentially safe, or not safe at all. During site visits a sketch was made to record the location and any distinct or important features.

## **6.2 Interpreting Primary Criteria into ArcMap**

The primary criteria from Table 20 were assessed using ArcGIS by examining the availability, source, and feasibility of manipulating, analysing and applying the GIS data.

### **6.2.1 Land Use**

Land use in terms of activities on site was determined using a combination of layers and orthographic imagery from the City of Victoria, CRD's Regional Community Atlas and Google Map, GIS data from the Canada Land Inventory (CLI), and site visits. The City of Victoria and CRD's orthographic photos were used to observe any existing structures on site to suggest the potential land use, such as a vacant lot or playground. A site visit would verify the current land use activities, which helped to determine land ownership and note the adjacent land use. For example, a baseball diamond may have been city-owned while a church was institutional land. The City of Victoria also provided a shapefile layer entitled 'Building3D' composed of polygons representing the space occupied by buildings throughout Victoria. The presence of buildings could then be eliminated during site selection.

The ownership of specific parcels was identified by consulting Google Maps and the GIS layer Cadastral Base Mapping – Integrated Cadastral Fabric (CBM-ICF) from the DataBC's Geographic Data Discovery Service. The CBM-ICF layer identified federal, provincial, municipal, private, and unknown ownership of land parcels. However, when checking the accuracy of this layer, not all parcels were accurately identified. For example, the British Columbia Legislature Building and Beacon Hill Park were labeled

as ‘unknown’ in the ownership class of the attribute table. The inaccuracies of the CBM-ICF layer identifying ownership resulted in the layer being consulted, but not used for analysis.

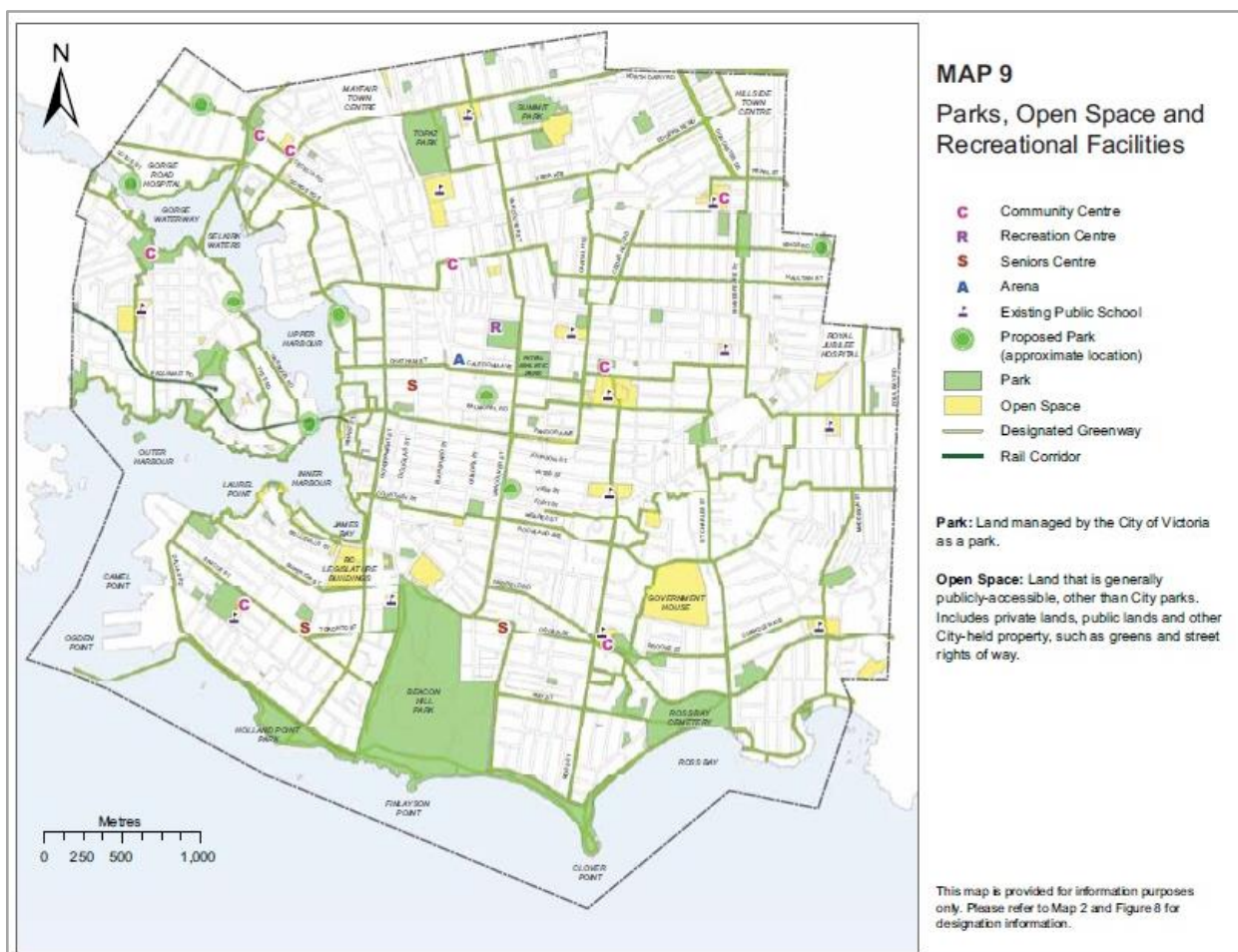
Most parcels depicted in the CBM-ICF have a Property Identification (PID) number associated with the Land Title Survey Authority (LTSA). The PID number or address can be looked up online through the Canada Search & Registry Corporation to determine the registered name of ownership. However, the online assessment service costs approximately fifty dollars (n.d.), presenting a significant financial and logistical barrier when trying to determine land use and ownership of individual parcels. Thus, the identification of the exact ownership and land use was not pursued after the final sites were selected.

#### Parks and Public Land

Despite some participant and perceived public opposition, existing park space was included in the inventory because the interviewees in support of its inclusion believed it represented public land, and the addition of a community garden to park space had the potential to enhance recreational activities and ecological capacity of area. To maintain a balance with interviewees opposed to the inclusion of parks and public land, passive or underused park space was targeted, while actively used areas such as prominent sports fields, were omitted. Potential sites identified on designated dog parks were also removed from site selection.

The location of proposed parks were also included in the site selection analysis because of the potential to include community gardens in their development and the interest in mixed use of large tracts of land. The OCP’s *Parks, Open Space and Recreational Facilities* map in Figure 15 was examined to distinguish between aforementioned land uses and to determine the location of the existing and proposed parks. There were a total of eight new parks proposed, and the OCP’s Chapter 21: *Neighbourhood Directions* was reviewed in detail to determine their exact locations to include them as potential sites for community gardens. Mindful of the possibility that food production will be much more of a priority in the near future it may well be that people may wish to be as generous as possible in terms of identifying potential sites so

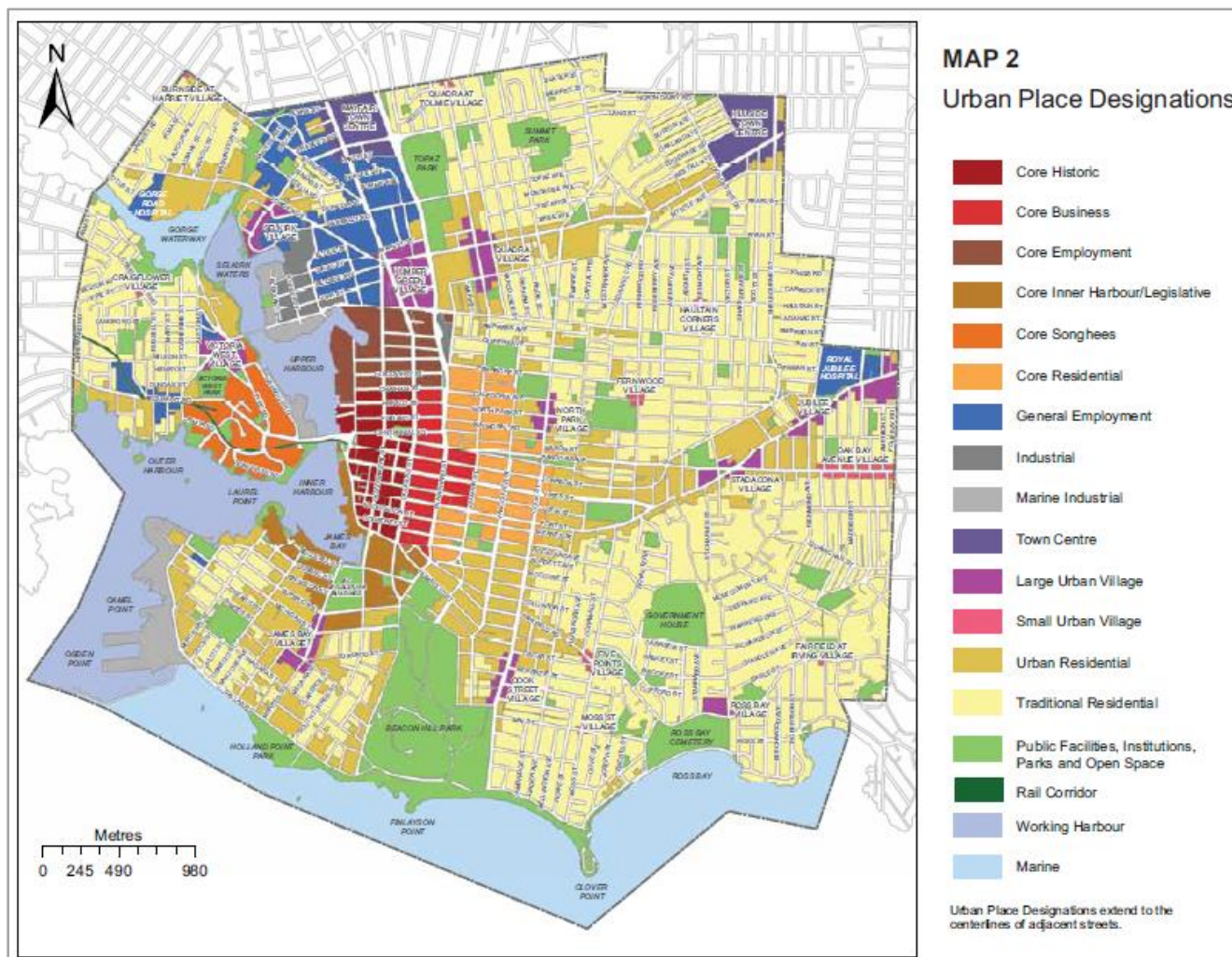
private spaces such as density housing were included but dog parks were not because of competing interest groups.



**Figure 15:** Map showing the City of Victoria’s Parks, Open Space and Recreational Facilities from the OCP (City of Victoria, 2012b, p.76).

### Zoning and Industrial Land

All zones and urban place designations were examined in the inventory, with industrial areas requiring a finer scale assessment with Google Maps. Industrial and marine industrial land; composed a small amount of land featured in the OCP’s Urban Place Designations map of Figure 16. Though small, the industrial areas were included in the site selection because initial Google Maps surveys indicated extensive open space in proximity to high density housing.



**Figure 16:** Map of the City of Victoria’s Urban Place Designations from the OCP (City of Victoria, 2012b, p.36).

### School Land

For school land, the existing locations were listed and mapped online by the Greater Victoria School District 6. The district map was combined with the GIS data from the City of Victoria to create a shapefile (Figure 17) illustrating the exact location and property size of schools within Victoria.



**Figure 17:** Map of school land throughout the City of Victoria.

### Residential Land and Density Housing

It is important to note that residential land was not a point of discussion in the interviews or a focus of previous UALIs because it was believed to be difficult to access and secure long term because it is privately owned and operated. Hence, a majority of residential land was omitted from the final site selection. An exception was made for vacant or underutilized residential land parcels because they provided an opportunity for interim gardens, community improvement, increased site access, and re-purposing land. Residential land was identified in a layer from the City of Victoria illustrating the Urban Place Designations.

Density housing in Victoria, including apartments, condominiums, seniors residences and community housing, was also assessed. Although this was private land,



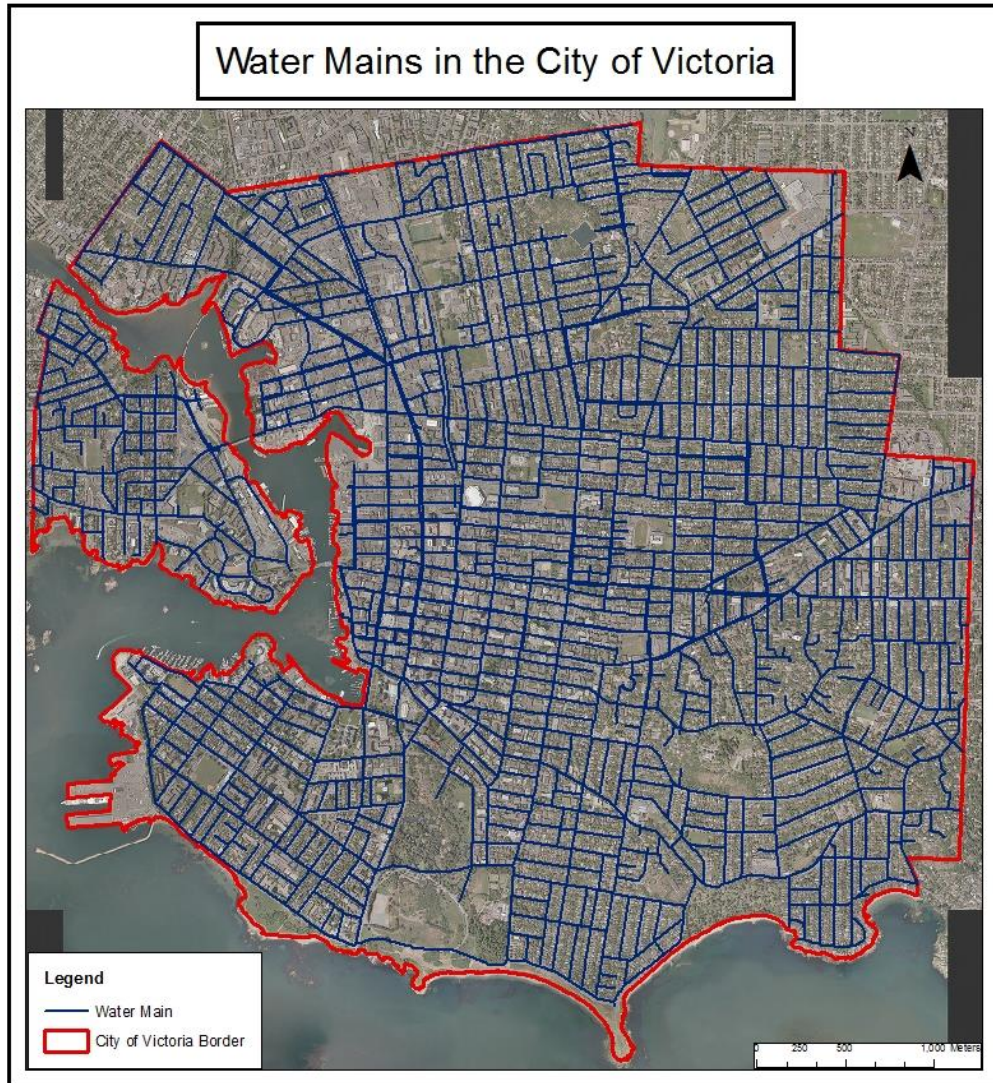
parcels of open green space were included into the inventory because they appeared opportune for sites in proximity to density housing.

#### Adjacent Land Use, Vacant and Underused Land

Adjacent land uses were considered during site visits to factor in what might influence site development. Examples of adjacent land use include high density residential areas where demand for community gardens may exist. Vacant and underutilized land and marginal park land, which may be vacant or partially vacant, were also considered because they represented land underserving its intended purpose. Vacant land was identified by consulting the orthographic imagery from the City of Victoria, CRD, and Google Maps, as well as conducting a site visit to gather a general impression of the community's usage.

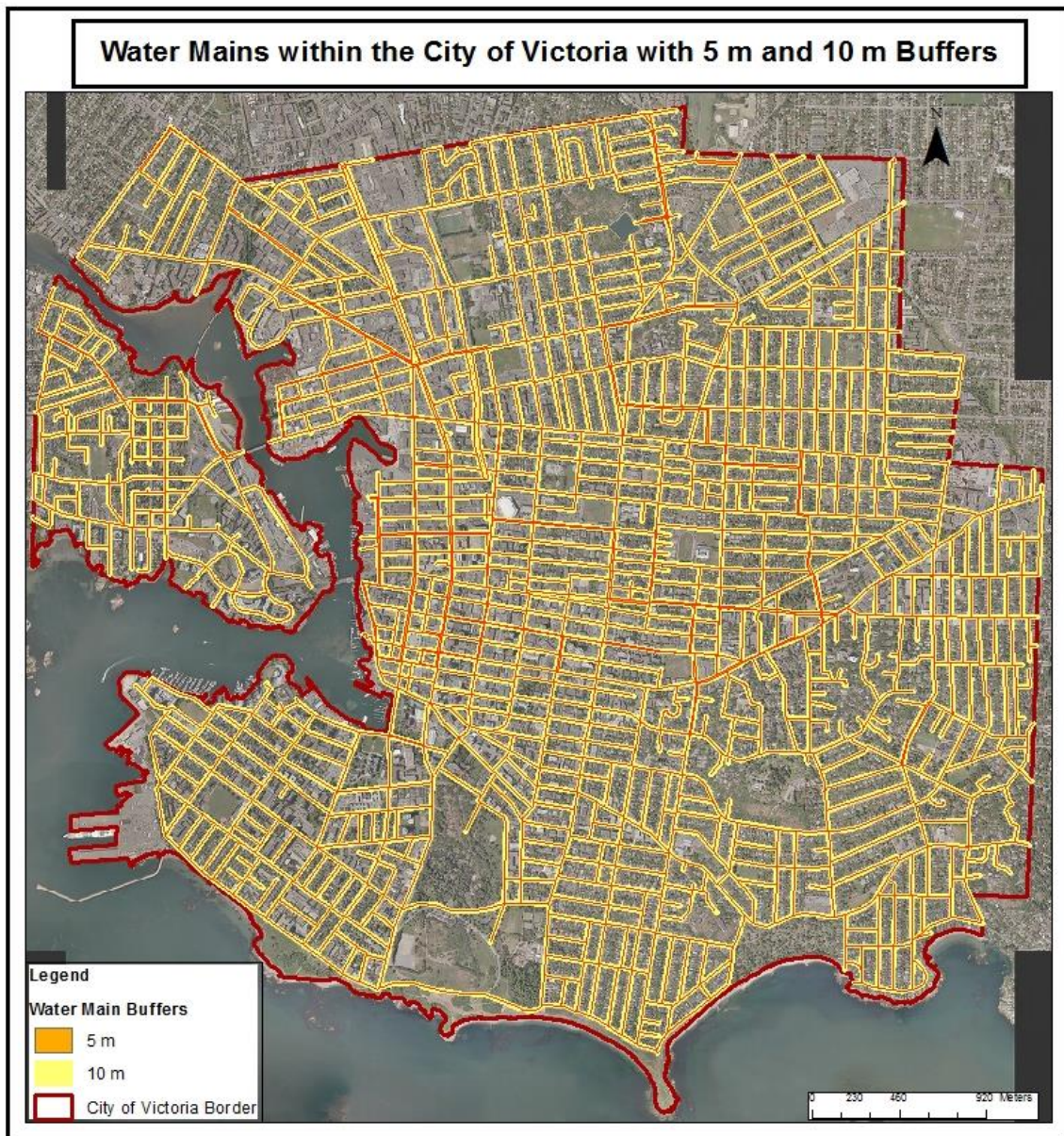
#### **6.2.2 Water Availability**

Water availability was elevated to a primary criterion and basic water access could be assessed by determining the presence or absence of curbside water mains. A GIS layer from the City of Victoria indicated the location of most civic and major water mains throughout the city (Figure 18).



**Figure 18:** Map of water mains GIS layer from the City of Victoria (2011).

However, when reviewing the water main layer, it was difficult to determine which side of the street a water main was located on in comparison to the City of Victoria's orthophoto. To determine a suitable distance for locating sites within proximity of a water main, multiple ring buffers of 5 m and 10 m were created to examine the range sites within and outside of each range. The buffers are featured in Figure 19 and produced mixed results, as 10 m was found to be too great a distance by including sites across the street, while a 5 m buffer and excluded parcels with a water main adjacent to the lot or on the same side of the street, limiting the number of sites.



**Figure 19:** Map of water mains with 5 m and 10 m continuous buffers.

To improve upon the buffer analysis of the water main, the attribute table of the shapefile containing the remaining sites was carefully reviewed to determine an appropriate distance for a threshold to eliminate sites too far from access. This resulted in the elimination of sites greater than 6.81 m away from a water main.

While the water main analysis was an important criterion to include, the lack of detail in the water main GIS data set, such as civic water mains and service access on site, appear to be significant limiting factors for site selection.

## Location of Service

The location of service on site was also considered important and the water main layer also indicated the size of the water main, ranging from civic water mains of 25 mm to major water mains greater than 300 mm in diameter. Regardless of the size, a site with access to a curbside water main could be detected using a buffer of 6.81 meters, excluding sites outside of this range.

However, the location of the service connection and the size of service remained unknown. Due to the lack of data locating service connections, they were not assessed as a primary criterion in this study. Once sites were narrowed down to individual parcels, the location and size of water service could be determined during the site survey or by contacting the City of Victoria.

### **6.2.3 Proximity to Density Users, Community Hub or Prominent Feature**

As stated, evaluating proximity to density users relied upon using the City of Victoria's Urban Place Designations layer illustrating Core Residential, Core Songhees and Urban Residential because they accounted for multi-unit residential land use. Though the Traditional Residential category also included multi-unit residential as a land use, Urban Residential had a higher density ratio (City of Victoria, 2012b, p.28-39). Using the walkability model from the discussion of Accessibility (5.2.5), sites located within a distance of 400 m of the OCP's Urban Residential areas were considered in proximity to density users.

For the criterion 'proximity to community hub or community feature, such as a church, school, or community centre', a 400 m buffer was also considered. However, since a layer indicating the location of these features was unavailable, the 400 m buffer could be applied to the remaining final sites to determine if there were any prominent community hubs or features within proximity of a site.

### **6.2.4 Heritage Designations**

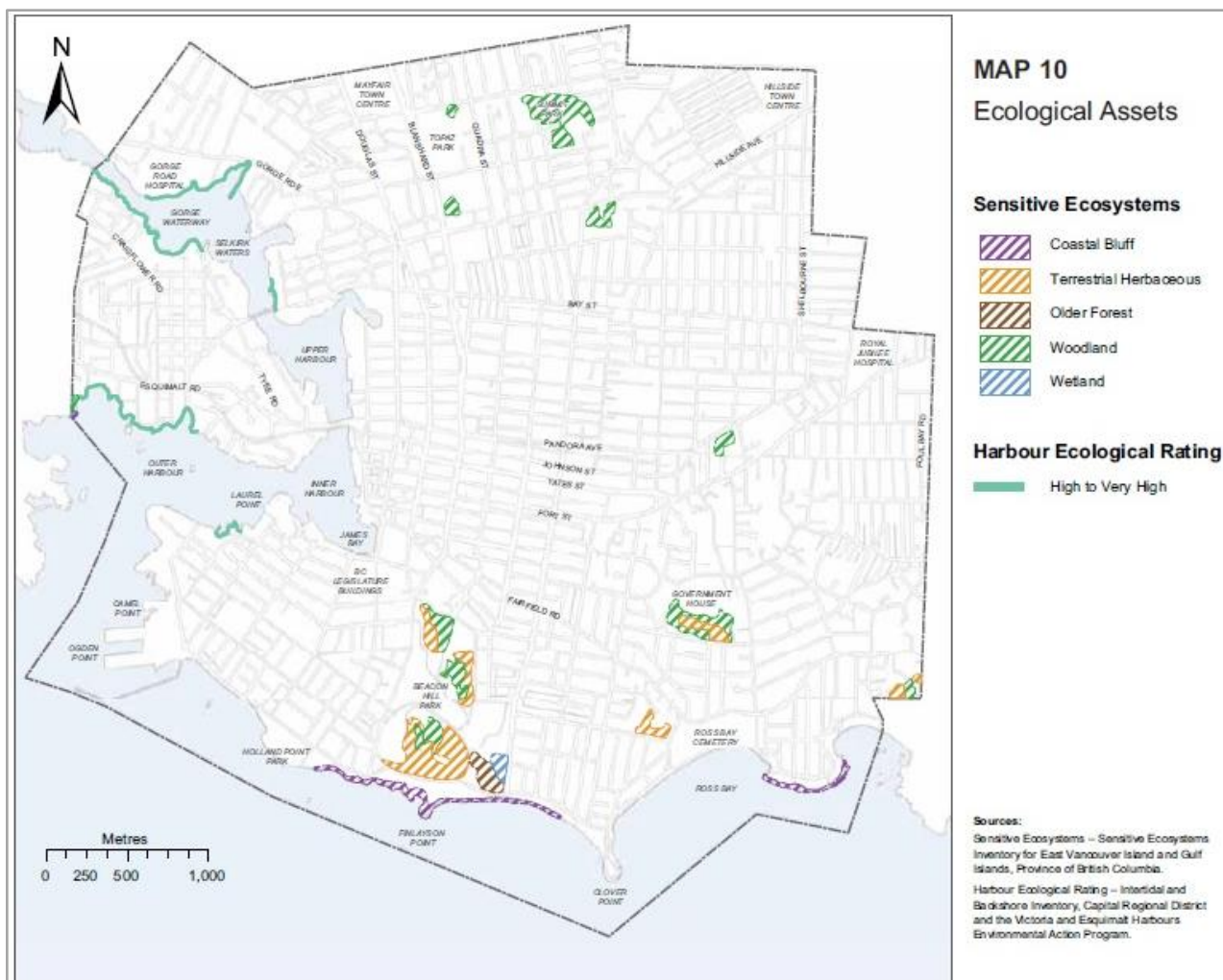
Heritage sites listed as 'heritage designations' were removed from consideration because the process of gaining access to the land may prove overly challenging. A shapefile from the City of Victoria's Open Data Catalogue distinguished between parcels

with heritage designations, which are formally protected, and the heritage registry, which are parcels listed with the City as sites of interested, but not formally protected.

#### **6.2.5 Not to Include Protected Green Space**

Although the City of Victoria does not have any protected green space within its borders, environmentally sensitive areas were considered instead. Since the majority of interviewees in favour of excluding environmentally sensitive areas, sites identified in the OCP's EA map were eliminated from site selection. However, environmentally sensitive areas are considered suitable for commons gardens because commons gardens have the potential to complement the existing ecosystems and natural areas on site by adding to biodiversity (Lawson, 2008), creating habitat, and promoting environmental stewardship (Goddard, Dougill, & Benton, 2010). Overall, environmentally sensitive areas were excluded from the inventory but sites in proximity to such areas were considered.

The latest OCP contains an Ecological Assets (EA) map (Figure 20) illustrating environmentally sensitive areas identified by the Ministry of the Environment's Sensitive Ecosystem Inventory (SEI). The SEI was conducted in 1997 and updated in 2004 depicting "places that have special environmental attributes worthy of retention or special care" (British Columbia's Ministry of Water, Land and Air Protection, Ecosystem Standards and Planning Biodiversity Branch, 2004). However, due to concerns regarding the inconsistency of existing maps, an assessment of site conditions was conducted during the final site visit to confirm the presence and extent of existing sensitive ecosystems.



**Figure 20:** Ecological Assets Map from the City of Victoria’s OCP (2012b, p.81).

### 6.2.6 Soil and Ground Cover Analysis

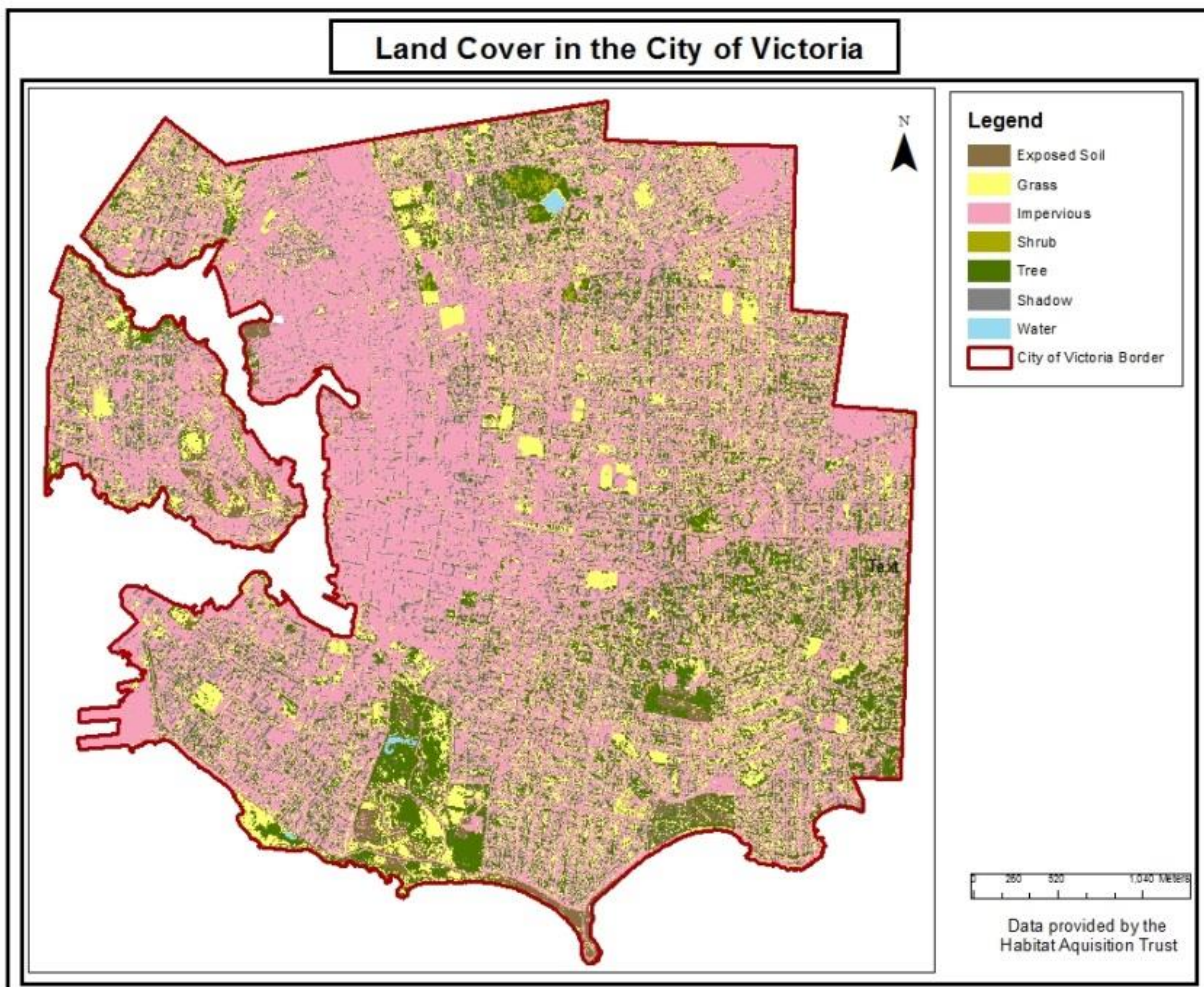
Since interviewees disagreed about using soil as a primary criterion, the inventory represented both interests by favoring the presence of soil, yet including mixed surfaces such as gravel, for consideration. The desirability of soil on site was also dependent on the size of the site, as larger sites without soil would require greater inputs and incur significant start-up costs. Preference was given to larger sites with soil, while smaller sites without soil were still considered for a community garden.

The presence or absence of soil was examined using orthographic photos and satellite imagery, as well as by acquiring pre-existing layers. The principal source of satellite imagery was a 2009 orthographic photo with 1 m accuracy, provided by the City of Victoria. The Capital Region District also hosts a web mapping application entitled the

‘Regional Community Atlas’ which allows the public to access aerial photography and digital layers of the region online (2012). The CRD also provided a WMS layer, *Aerial Photography*, which was added to the GIS Server to examine the 2011 orthographic photos in greater detail before ground-truthing them.

The most valuable information regarding soils was a detailed raster layer from the Habitat Acquisition Trust (HAT) depicting the land cover of the entire Capital Region District in 10 different subset classes with a 1 meter resolution. The subset classes were: Agriculture, Expose Soil, Grass, Gravel, Impervious, Marsh, Shadow, Shrub, Trees, and Water. The HAT raster was clipped to the City of Victoria’s borders to reduce the volume of data for faster processing when converting the raster to a polygon. The conversion of the raster was to separate the different ground cover classes for further analysis. After isolating the ground cover types, only 7 different types remained within the City of Victoria. The classes removed during the conversion were Agriculture, Gravel, and Marsh. The classes remaining were Exposed Soils, Grass, Impervious, Shadow, Shrubs, Trees, and Water. The remaining classes were each selected by attribute through the ‘grid code’ column and the data was exported into a new shapefile (Figure 21). The division of classes into individual shapefiles allowed for the characteristics and attributes of each aspect in the layer to be compared and analysed.

While the HAT layer of the ground cover classes was precise, the illustrated areas did not appear to accurately represent the current land use. The accuracy of the digitizing was also questionable as it did not align with the 2009 or 2013 aerial imagery. Overlap between different land cover was expected, but areas representing impervious surface were actually mixed, gravel or adjacent to a road. Since there were inconsistencies in the illustration of all land cover types, parcels representing potential sites for community gardens would be digitized by hand and in reference to the 2009 and 2013 aerial imagery.



**Figure 21:** Map of the Land Cover Classes in the City of Victoria from the Habitat Acquisition Trust.

Soil quality, contamination and the potential for remediation required an on-site assessment. Although the costs associated with soil testing varied, an investigation into the history of land use provided an affordable alternative while granting insight into the integrity and condition of the soil. Furthermore, the Canadian Agriculture Land Inventory (CLI) examining soil capability for agriculture was consulted, but did not cover the Capital Region District and therefore could not be used for this study. As a result, the base layer representing ground cover, as well as land use, was created by manually digitizing sites to ensure an accurate representation of the current land use activities.



### 6.2.7 Sun

The amount of sun available to a site was difficult to determine using GIS analysis because the only layer indicating 'shadow' was the HAT's land cover layer, which did not specify the time of day the image was based on, or if it was illustrating the full range of shadows throughout the day. Therefore sun was considered on site in terms of the factors affecting sunlight, including the presence of buildings, tree canopy cover and shade.

### 6.2.8 Size Classifications

Existing allotment and commons gardens were surveyed to determine the size of each garden, and the size and number of plots. This analysis provided insight into what an acceptable scale range would be, while establishing the minimum, average, and the maximum size of community gardens.

#### Allotments

As of 2013, there were a total of 6 allotment gardens identified as currently operating in Victoria (Table 21). The smallest allotment garden in Victoria was the Rayn or Shine, with an area of 2,500ft<sup>2</sup> and only 9 plots. The average size of an allotment gardens was 6,722 ft<sup>2</sup>, and the average number of plots was 23. In addition, the largest allotment garden was the James Bay Allotment Gardens, with a size of 14,859 ft<sup>2</sup> and 54 plots. Since Rayn or Shine had 9 plots, and Leval and Epstein suggested 10 plots as a minimum, a minimum number of 10 plots were considered suitable for an allotment garden site. To determine the minimum size of an allotment garden, the average size of a plot in Victoria was calculated and resulted in a size of approximately 7.6 by 15.1 feet. Therefore the minimum size of a site accommodating 10 plots would be 76 by 151 feet, or increased to 80 by 160 feet; 12,800 ft<sup>2</sup> to include footpath access.

**Table 21:** Attributes of Allotment Gardens in the City of Victoria.

Allotment Garden		Size of Area (approximate square feet)	Number of Plots	Size of Single Plot (approximate feet)	Location
1)	James Community Gardens (Michigan Street Community Gardens)	5,000	20	4 x 18 (14) 4 x 14 (5)	Corner of Michigan and Menzies
2)	James Bay Allotment Gardens (Montreal Street Allotment Gardens)	14,859 (127 x 117)	54	16 x 12 (average size surveyed)	Montreal Street, Brown, Oswego and Niagara
3)	Fernwood Allotment Garden	14,008 (103 x 136)	34	16.5 x 8 (average size surveyed)	1216 North Park (Greater Victoria Compost Education Centre)
4)	Earth bound Organics Community Garden	6,444 (48 x 134)	20	4 x 16 (12) 10 x 10(6) 12 x 12 (2)	Garden Street, close to Bay Streets
5)	Rayn or Shine Community Garden	2,500 (50 x 50)	9	4 x 12	Raynor St. & Craigflower Rd.
6)	Cecila Ravine Community Gardens (Burnside Allotment Garden)	4,243 (121 x 35)	24	3 x 12	Cecelia Ravine Park, 3130 Napier Lane
<b>Average Size or Number of Plots</b>		<b>6722</b>	<b>23 (161 total )</b>	<b>7.6 x 15.1</b>	

### Commons

Since there were only three formally established commons gardens, boulevard gardens were also considered as a style of commons gardens. However, because boulevard gardens are largely undocumented spaces, their size was unknown and they were not included in the commons garden inventory.

Based on the size of the three known commons gardens in Table 22, the smallest commons, Wark Street, was used as a baseline for the minimum size of a commons garden. Wark Street Commons has an area of 1,768 ft<sup>2</sup>, while Spring Ridge Commons has the largest area of 15,410 ft<sup>2</sup>. The average size of a commons garden in Victoria was 7,059.3 ft<sup>2</sup>. Since the area of Wark Street Commons was approximated and participants' were interested using smaller spaces for commons gardens, the minimum size of a space for a commons garden was lowered to 1,500 ft<sup>2</sup>.

**Table 22:** Attributes of Commons Gardens in the City of Victoria.

	Commons Gardens	Size of Area (approximate square feet)	Location
1)	Wark Street Commons	1768	2575 Wark Street (King and Wark, in Wark Street Park)
2)	Banfield Commons	4000	Banfield Park (Raynor and Craigflower)
3)	Spring Ridge Commons	15410 (115 x 134)	Chambers and Gladstone

### Minimum Size Thresholds

The minimum size thresholds determined in the previous sections were discussed in square feet to reflect interviewees' preferred units of measure, but were converted from square feet to square metres for application in ArcMap. Despite evaluating Kaethler's size classification chart (Table 7), the size class ranges were not used, but a minimum size was set to eliminate sites too small to accommodate an allotment or commons garden (Table 25). The minimum size of space required for a commons garden was an area of 139.4 m<sup>2</sup>, and the minimum size of space for an allotment garden was 10 plots, resulting in a minimum area of 1189.2 m<sup>2</sup> (Table 23).

**Table 23:** Size Classification and Thresholds of Allotment and Commons Gardens.

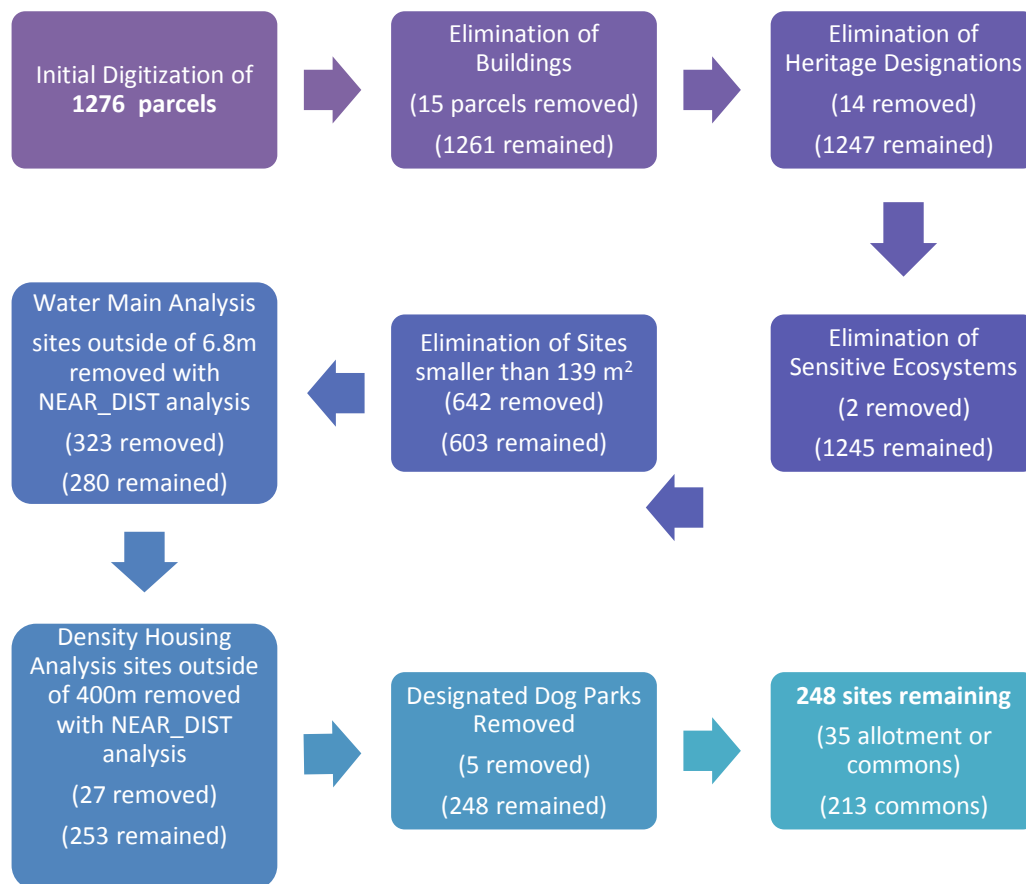
Attribute	Allotment Garden	Commons Gardens
Number of Plots	10	N/A
Minimum Size(m <sup>2</sup> )	1189.2	139.4
Preferred Land Use	Impervious surfaces or poor soil for container garden	Parks or natural areas

### 6.3 Implementing Primary Site Selection Criteria into ArcMap

As demonstrated during the interpretation of primary criteria into ArcMap (6.2), the final GIS analysis was dependent upon the availability and quality of data. Using the findings from the review of GIS data, this section describes the steps taken to conduct the UALI and implement the site selection criteria interviewees prioritized into a GIS analysis. The GIS analysis included a manual digitization of parcels to provide a base layer for further analysis. This layer highlighted land cover with grass, soil or mixed surfaces and access to sunlight. I also sought land ownership including public, institutional, industrial and private land, as well as land uses such as schools, hospitals, parks, and boulevards, and density housing.

From the initial digitization, buildings, heritage designations, sensitive ecosystems and sites smaller than 139 m<sup>2</sup> were removed. A buffer analysis also removed sites 6.8 m away from a water main and 400 m away from density housing. Designated dog parks were also removed to avoid future land conflicts. The process undertaken to implement the analysis is illustrated in a decision tree in Figure 22, with each step stating

the criteria considered and the number of parcels removed and the remaining number of parcels for the next segment of analysis.



**Figure 22:** Decision Tree of the GIS Analysis.

As Figure 22 illustrates, the initial 1276 parcels was reduced to 248 potential community garden sites, with 35 allotment or commons and 213 commons gardens. The remainder of this section details how each criterion was applied to determine the final community garden sites.

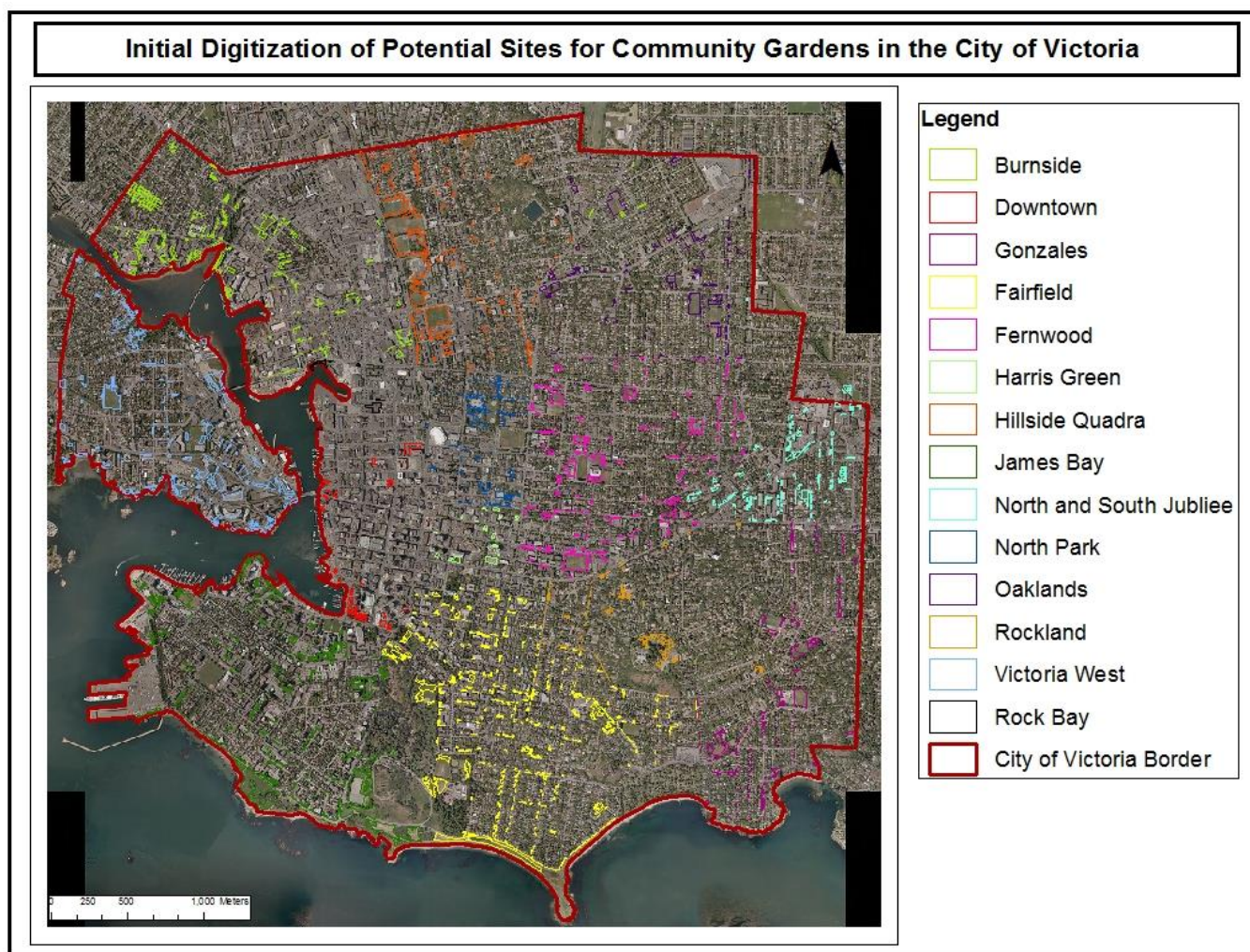
### 6.3.1 Digitization of Potential Surfaces and Land Uses

Since layers indicating soil, sun or shadows were not available, the first step in site selection was to manually digitize spaces appearing from the orthophotos to have grass, soil or mixed surfaces, as well as access to sunlight. In order to reduce the number of inappropriate parcels digitized, residential properties were avoided and parcels were

selectively digitized according to the desired type of ownership and land use. Parcels appearing within public, institutional, and industrial land were digitized, with public and institutional land including schools, hospitals, parks, and boulevards. Private land featuring density housing, such as apartments, condominiums, senior's residences and co-op or community housing, was also included.

While the locations of proposed parks were sought out during the manual digitization stage tree canopy, vegetation density and industrial use rendered them unsuitable for the initial digitization which sought open parcels of land. Of the 8 proposed parks, 4 were included in the initial manual digitization as potential spaces for community gardens.

Sections of boulevard were also digitized because of the interest expressed by participants. Boulevards are part of City-owned land, and there was the potential for identifying large parcels for commons gardens. Although there is currently 300 kilometers of boulevards in Victoria (City of Victoria, 2009a), not all boulevards were digitized because the majority were obscured by tree canopy cover or considered too small to host a sustainable number of users. The digitization of a boulevard was dependent upon the size appearing to be equal or greater than two car lengths (approximately 8-10 meters). Creating a visual threshold limited the inclusion of boulevard tracts which could be too small. Boulevards located in proximity to each other along a street or around an intersection were also merged into a single feature. This was to create potential clusters of boulevards and to determine the total area of boulevard space available in an area. The initial digitization relied upon visually examining and scanning the City of Victoria's 2009 orthophoto and consulting the CRD's 2013 satellite imagery to identify sites. Potential parcels were digitized into polygons with unique shapefiles according to each neighbourhood. The initial digitization of potential community garden sites according to each neighbourhood is illustrated in Figure 23.



**Figure 23:** Map of the initial digitization of potential sites for community gardens in each neighbourhood of the City of Victoria.

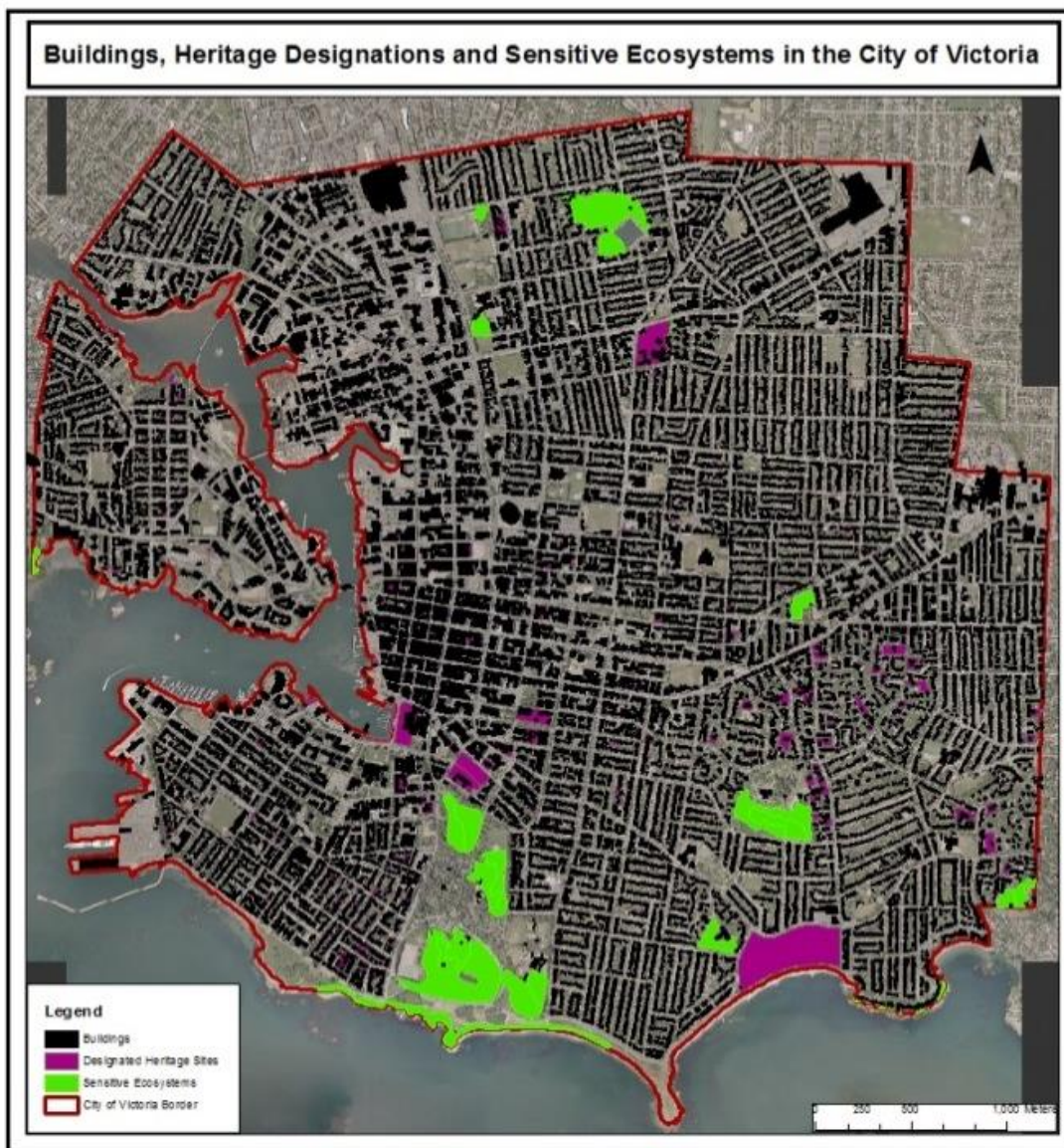
Identifying each polygon by neighbourhood as important because once the digitization was complete the shapefile of each neighbourhood was merged into a single layer. The single file contained a total of 1276 parcels and 678,109.9 m<sup>2</sup> in area, representing approximately 3.3 % of Victoria's landscape. It provided the base layer to conduct further analysis by eliminating unsuitable sites and highlighting desirable sites.

It was important to note the potential for error while digitizing was significant because of the conflicting satellite imagery and the contingency upon the researcher's identification of sites. While every street was examined numerous times at fine and coarse scales, the potential for oversight of potential parcels remained. There were also inaccuracies in the satellite imagery because their orthographic angle of projection did

not often correspond and each image illustrated a different time of the day. The areas highlighted during digitization were primarily based on the City of Victoria's 2009 orthoimagery because it was faster to process and more reliable because it did not require the internet to access. The CRD's 2013 orthophoto was consulted to note any changes in land use.

### **6.3.2 Eliminating Unsuitable Spaces**

The next step was to eliminate sites that overlapped with unsuitable spaces, including: the presence of buildings, heritage designations, sensitive ecosystems, parcels too small for commons or allotments, without access to water and not in proximity to density housing. The first step in this analysis was to elimination of buildings (1261), heritage designations (1247) and sensitive ecosystem (1245) using the overlay analysis tool 'Erase'. The coverage of each is depicted in Figure 24.



**Figure 24:** Map of the existing coverage of buildings, heritage designations, and sensitive ecosystem in the City of Victoria.

#### Size

The size thresholds for commons and allotment gardens were applied by using a ‘select by attribute’ query on the remaining digitized sites and exporting the data into a unique layer. The size threshold of 139 m<sup>2</sup> for commons gardens was applied as a minimum because it encompassed both allotment and commons size class limits. The allotment threshold of 1189 m<sup>2</sup> could then be illustrated using the layer property’s symbology classes to assign distinct class ranges.



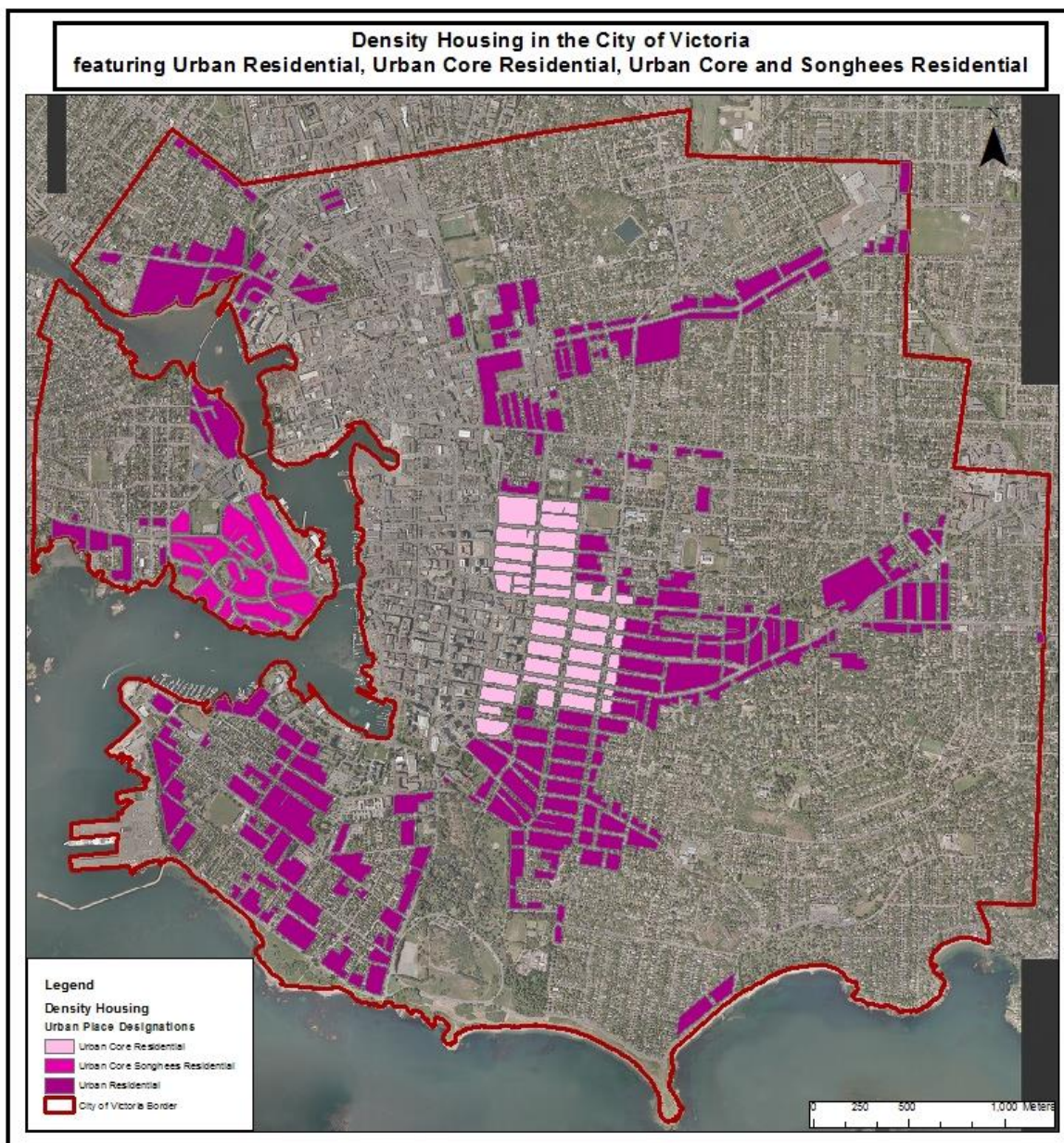
The size analysis resulted in a total of 603 parcels suitable for commons gardens and 110 parcels suitable for allotment or commons gardens.. Since the size range for commons gardens overlapped with allotments gardens, sites greater than 1189 m<sup>2</sup> in area were considered for both styles of community gardens, with allotment gardens prioritized because of the smaller size class range resulting in fewer potential sites. The size thresholds were also effective in eliminating slivers remaining from portions of parcels removed when applying the Erase tool for unsuitable spaces.

#### Water

The water main analysis eliminated sites greater than 6.81 m away from a water main. Sites without access to water mains were determined by conducting a proximity analysis using the 'Near' function to determine the distance of parcels to the nearest edge of a water main feature. The water main analysis resulted in a total 280 potential sites for commons gardens, with 43 suitable for allotment gardens or commons gardens.

#### Density Housing

Sites within 400 m of Urban Residential, Urban Core Residential, Urban Core and Songhees Residential were also highlighted by using the 'Near' tool, resulting in 253 potential sites for commons gardens, with 40 potential sites for allotment or commons gardens. The layer indicating density housing is featured in the map of Figure 25.



**Figure 25:** Density Housing in the City of Victoria.

### Dog Parks

Potential sites located in designated dog parks were also eliminated from consideration, including Alexander Park, Arbutus Park, Beacon Hill's dog park along Dallas Road from Douglas Street to Clover Point, and a section from Redfern Park, representing 5 parcels of land. Though Banfield, Victoria West and Topaz Park were listed as dog parks, they are large parks and the sections actively used by dog walkers

were unfamiliar to the researcher and were therefore not removed. The loss of sites in dog parks was a significant loss of potential community garden space, as they were large parcels of land.

### Conclusion

From the digitization of 1276 sites, to the elimination of 1028 unsuitable parcels, 248 sites remained with the potential for community gardens composing an area of 208911.5m<sup>2</sup> or 1% of Victoria's landscape.

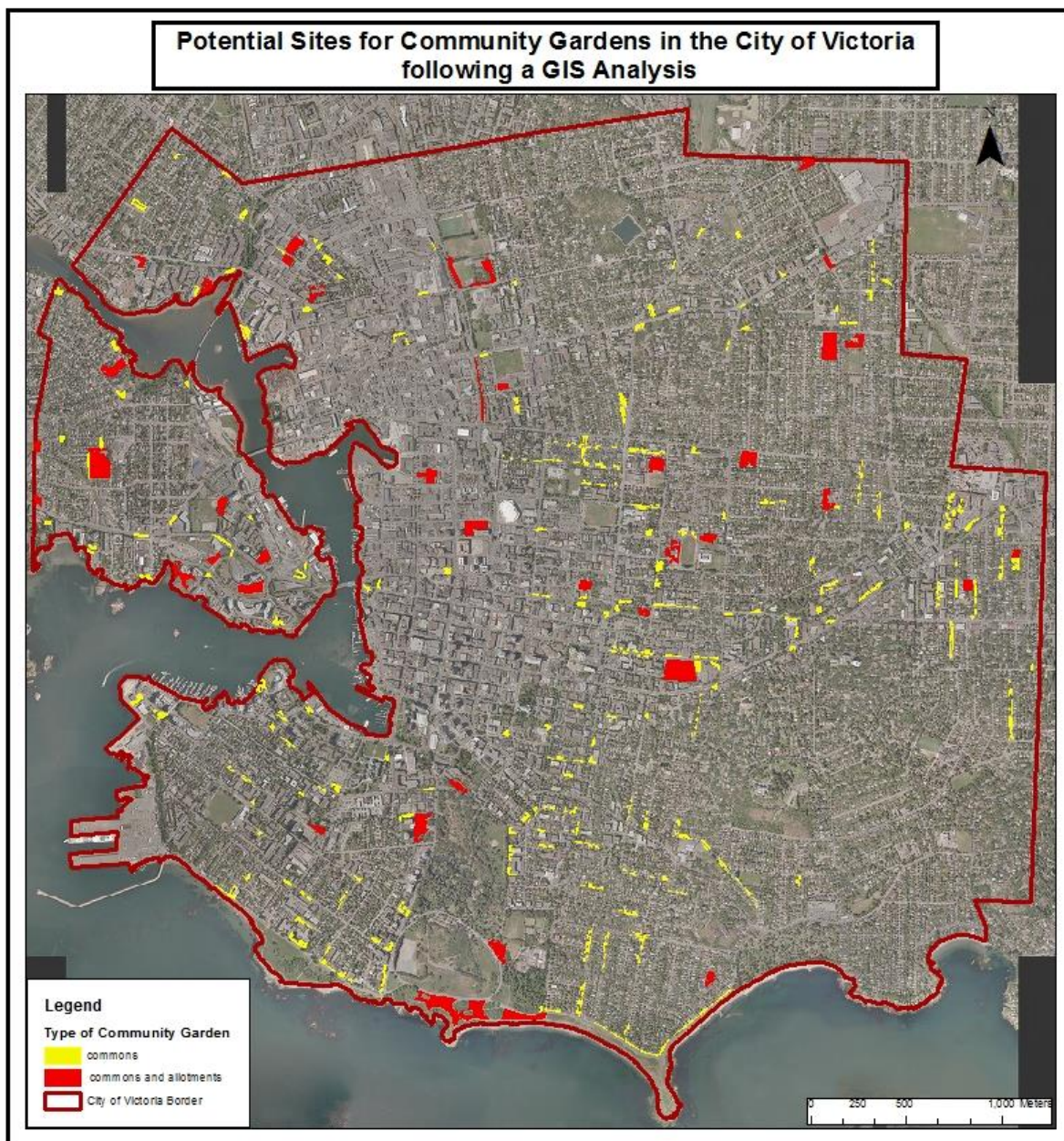
The water main analysis and the size threshold for commons gardens were the most influential criteria because their application resulted in the removal of 642 and 323 sites respectively. When examining the community garden sites according to type, 35 had the potential for allotment and commons gardens and 213 were exclusively for commons gardens (Table 24).

**Table 24:** Type of Community Garden according to the Number of Sites and Area

Type of Community Garden	Number of Sites	Area(m <sup>2</sup> )	Percent of Area Covered (%)
Commons	213	130686.02	62.6
Allotment or Commons	35	78225.43	37.4
<b>Total</b>	<b>248</b>	<b>208911.5</b>	<b>100</b>

Based on these findings, the average size of a site was 842.4 m<sup>2</sup>. The largest plot had the potential to be an allotment or common garden, residing in Fernwood with an area of 15211.7 m<sup>2</sup> (FID 58), while the smallest plot also resided in Fernwood but only had the potential for a commons garden as it was 140.97 m<sup>2</sup> in area (FID 35).

The small number of sites suitable for allotment gardens was anticipated due to the interviewees stating that finding large parcels of land would be difficult to find in Victoria because of the population density and scarcity of land, as well as commons gardens having a lower size threshold to find potential sites. The 248 sites remaining from the GIS analysis are mapped in Figure 26. The next step was to rank and profile sites to determine their suitability based on the desired secondary criteria.



**Figure 26:** Potential Sites for Community Gardens in the City of Victoria following a GIS analysis.

### 6.3.3 Identifying Site Attributes and Ranking Criteria

Additional fields were added to the final site's shapefile's attribute table to indicate the type of land use and ownership, approximate location, and title of the remaining 248 sites. A field for land use (Land\_Use) identified the foremost activity taking place on site and included apartments, boulevards, churches, condos, co-ops,

hospitals, institutional, military, open space, park, rail yard, school, senior housing, townhouses, utility, or vacant land. Ownership (Ownership) was identified as municipal, provincial, federal, church, school, private or unknown. The location (Location) of a site was identified using Google Maps to determine an exact or approximate address for geographic reference. Most known locations, such as parks, hospitals and schools had distinct addresses, while vacant lots, boulevards, road ends and open space were addressed according to street or the nearest intersection. A field including the known name of a site (Title), such as Beacon Hill Park or the Comfort Inn Hotel, was also added. Lastly, a field was created for 'Additional Observations' to describe any further details regarding the site's location.

#### Summary of Site Attributes

Organizing the characteristics of GIS-based site attributes from largest to smallest illustrated the types of sites offering the greatest opportunity for community gardens. Drawing from the information gathered into the final sites' attribute table, the following tables were created to represent a summary and hierarchy of the specific attributes documented in the final sites shapefile. Each table was cross-checked with the total number of sites (248) and area (208911.5m<sup>2</sup>) using Microsoft Excel 2010.

#### *Ownership*

When examining the type of ownership by the number of sites in Table 25, land owned by the municipality (representing the City of Victoria) had the most number of sites. The high number of municipally owned sites was due to the inclusion of boulevards, which composed 84 potential sites, and the remaining municipal land had 30 parks, 6 open spaces and 1 vacant lot. Private land was the second highest, with 97 sites, and was the result of including patches of lawn and open space on land with density housing (80), businesses(6), vacant lots (6), rail yards (2) and open space(1). Church, federal and unknown had the least number of sites (Table 27).

**Table 25:** Land Ownership according to the Number of Sites (Largest to Smallest)

	Type of Ownership	Number of Sites	Total Area(m <sup>2</sup> )
1	Municipal	121	98609.17
2	Private	97	55270.74
3	School	11	40722.76
4	Provincial	10	8464.6
5	Church	3	686.37
6	Federal	3	2027.54
7	Unknown	3	3130.27

Municipal land ownership remained the predominant land ownership when ranking sites according to area in Table 26. The only change when ranking sites was that church ownership composed the smallest amount of land.

**Table 26:** Land Ownership according to the Total Area (Largest to Smallest)

	Type of Ownership	Total Area(m <sup>2</sup> )	Number of Sites
1	Municipal	98609.17	121
2	Private	55270.74	97
3	School	40722.76	11
4	Provincial	8464.6	10
5	Unknown	3130.27	3
6	Federal	2027.54	3
7	Church	686.37	3

### *Neighbourhood*

Of all the neighbourhoods in Victoria, Fairfield and James Bay had the greatest potential for community gardens having the most (40) sites (Table 27), and over 20,000 m<sup>2</sup> in area (Table 28). In addition, Oaklands, offered over 21,000 m<sup>2</sup> of potential community gardening space and Fernwood offered 34 sites.

**Table 27:** Neighbourhoods according to the Number of Sites (Largest to Smallest)

	Neighbourhood	Number of Sites	Total Area (m <sup>2</sup> )
1	Fairfield	47	20841.07
2	James Bay	40	21234.51
3	Fernwood	34	4231.28
4	Victoria West	29	4697.75
5	Burnside	24	16743.82
6	Jubilee North and South	20	10041.85
7	Oaklands	17	21048.22
8	North Park	12	4663.71
9	Hillside Quadra	11	11640.49
10	Downtown	4	6646.26
11	Rockland	4	924.1
12	Gonzales	3	1252.06
13	Harris Green	2	978.96
14	Rock Bay	1	3513.73

**Table 28:** Neighbourhood according to the Total Area (Largest to Smallest)

	Neighbourhood	Total Area (m <sup>2</sup> )	Number of Sites
1	James Bay	21234.51	40
2	Oaklands	21048.22	17
3	Fairfield	20841.07	47
4	Burnside	16743.82	24
5	Hillside Quadra	11640.49	11
6	Jubilee North and South	10041.85	20
7	Downtown	6646.26	4
8	Victoria West	4697.75	29
9	North Park	4663.71	12
10	Fernwood	4231.28	34
11	Rock Bay	3513.73	1
12	Gonzales	1252.06	3
13	Harris Green	978.96	2
14	Rockland	924.1	4

### *Land Use*

There were 17 different types of land use identified by interviewees. The most frequently occurring land use was boulevards with 85 sites, and apartments with 64 sites (Table 29). When grouping the five land uses associated with density housing: co-op, townhouses, senior housing, condo, and apartments, they culminated into 80 sites and were 34,858.9 m<sup>2</sup> in area, representing 16.7 % of the total area identified for community gardens, compared to boulevards which composed a total of 13.1 % of the final sites.

**Table 29:** Land Use according to the Number of Sites (Largest to Smallest).

	Land Use	Number of Sites	Total Area(m <sup>2</sup> )
1	Boulevard	85	27283.89
2	Apartment	64	18959.29
3	Park	30	58043.65
4	School	12	44102.66
5	Condo	11	13806.83
6	Open space	9	9960.02
7	Business	8	2532.89
8	Vacant	8	20092.68
9	Church	4	2961.76
10	Hospital	4	3546.75
11	Institutional	2	758.2
12	Military	2	1844.05
13	Rail yard	2	2364.38
14	Seniors housing	2	988.22
15	Townhouses	2	591.33
16	Utility	2	561.62
17	Co-op	1	513.22

Park and school land also offered a significant amount of sites compared to the other land uses. When examining the total area of each, parks had the most area with 58043.65 m<sup>2</sup> (27.8 %), while school land followed with 44102.66 m<sup>2</sup> (21.1 %) in area (Table 30).

**Table 30:** Land Use according to the Total Area (Largest to Smallest).

	Land Use	Number of Sites	Total Area(m <sup>2</sup> )
1	Park	30	58043.65
2	School	12	44102.66
3	Boulevard	85	27283.89
4	Vacant	8	20092.68
5	Apartment	64	18959.29
6	Condo	11	13806.83
7	Open space	9	9960.02
8	Hospital	4	3546.75
9	Church	4	2961.76
10	Business	8	2532.89
11	Rail yard	2	2364.38
12	Military	2	1844.05
13	Seniors housing	2	988.22
14	Institutional	2	758.2
15	Townhouses	2	591.33
16	Utility	2	561.62
17	Co-op	1	513.22

### Ranking GIS-based Primary Criteria

Although the summary of attributes and their characteristics provided insight into the sites as a whole, it did not highlight the unique qualities of individual sites compared to one another. To highlight sites with desirable characteristics, a hierarchy was created to systemically rank characteristics and determine sites with the most potential to the least potential for community gardens.

The attributes which could be ranked using the results from the GIS analysis were land ownership and land use. Following a similar approach used in the Akron UALI (Oulton, 2012), a sub class range was assigned to each attribute's characteristics. The ranking ranged from 0 to 3, with 3 being the most desired and highest score. A perfect, cumulative score for land ownership and land use was 6. The value and prioritization of each attribute's characteristics were drawn from the interviewees' responses and formulated based on the land ownership and land use most suitable for community



gardens. The priority ranking and scores associated with land ownership and land use are featured in Table 31.

**Table 31:** Priority Ranking of Land Ownership and Land Use.

	Land Ownership	Land Use
<b>Rank</b>	3 = Municipal, Provincial, Federal 2 = School and Church 1 = Private 0 = Unknown	3 = Park, Vacant, Open Space, Boulevard 2 = School, Church, Apartment, Condos, Co-op, Townhouses, Seniors Housing 1 = Utility, Military, Hospital, Institutional 0 = Rail yard, Businesses

For land ownership, government owned land was the most valued, including municipal, provincial and federal land. School and church land were considered institutional land and ranked second, while private and unknown were valued least because of the potential difficulty accessing land. For land use, the most valued were park, vacant, open space and boulevards because of the desire for large and open space. Schools and churches remained second, and included density housing such as apartments, condos, co-ops, seniors housing and townhouses. Sites with utility, military, hospital or institutional land use were not as valued because of the potential disruption because they were actively used or transitional land. The least valued land uses were rail yards and businesses because of the pollution potential and private ownership.

#### Results from Ranking GIS-based Primary Criteria

Ranking sites according to land ownership and land use priorities rendered 123 with a perfect score of 6. Sites with a perfect score were predominantly boulevards (84) and municipally owned (121). Though there was only one site scoring 5 out of 6, which was a church, there were 28 sites scoring 4 out of 6. The sites scoring 4 out of 6 were school properties (10), vacant, private and provincial lots. There were also 84 sites scoring 3, which were mainly privately owned density housing (79), with mainly apartments (63) and condos (11). Not a single site scored 2, and only 10 sites scored 1 point, with privately owned businesses (6) composing the majority.

Upon closer examination, the ranking of priority sites segregated public and private land by highlighting municipally-owned boulevards and parks while de-valuing density housing and privately owned land. For example, if the lower fifty percent of sites

were to be eliminated, the remaining sites would be only composed of boulevards and parks. While ranking the sites was helpful to determine the most suitable sites overall, it would have also significantly reduced the number of sites and the potential for exploring other types of land ownership and uses. The ranking of sites proved to be an exploratory exercise, and the results derived from this analysis were not pursued further due to the limitations they imposed upon site potential.

#### **6.4 Assessing and Ranking Secondary Criteria**

While the ranking of primary criteria was decidedly limited, assessing and ranking secondary criteria required site visits and could only be applied to a few sites due to time constraints and volume of data required for analysis. Generating data to rank secondary criteria included assessing the following criteria from the Site Visit Form:

- Proximity to Community Hub or Prominent Location
- Sunlight
- Ecologically Sensitive Area
- Cedar Trees
- Pollinator Habitat or Vegetation

Ranking secondary criteria used the approach from Gainesville's UALI, where if a criterion was satisfied it was given a single point. Each of the criteria was worth 1 point, making a perfect score of '5' if all criteria listed were satisfied. The ranking of secondary criteria could be pursued during future studies of site suitability.

In addition, the walkability model with a radius of 400 meters was applied to potential sites to define the site's walkable catchment and highlight residential areas within proximity of a potential site. This was observed during the site visits with the 'adjacent land use' or 'additional observations'.

#### **6.5 Site Profiles**

Site visits and secondary criteria were evaluated for three sites selected from the resulting GIS analysis representing their potential for community gardens. The Site Visit Forms were completed with photos and any relevant information regarding a site's suitability to create a site profile. The site numbers associated with each profile represent the original Object ID assigned to each site in ArcMap. The site number was added for

ease of reference in ArcMap and Excel if a site's original attributes or information needed to be retrieved.

Site number 35 of Bushby Park (Figure 27) scored 4/5 for secondary criteria suitability ranking because it was within 400m of a community hub(1), had adequate sunlight(0.5), was not in an ecologically sensitive area(1) though it had cedar trees(0.5) and have the potential for pollinators(1) from residential gardens. A community garden in Bushby Park was considered high potential because the scale of the land was large enough for an allotment garden and it is located in a safe and accessible neighbourhood. The Bushby Park site also scored 6/6 for the primary criteria ranking, making this site an ideal recommendation for a community gardens.

Site number 1240 in Rock Bay(Figure 28), scored 3/5 for secondary criteria suitability ranking because it was not within 400m of a community hub(0), had adequate sunlight(1), was not in an ecologically sensitive area(1) or had cedar trees(1) and did not have the potential for pollinators(0) from adjacent sites. A community garden in Rock Bay was considered medium potential because the scale of the land was a significant size for an allotment garden but the site and neighbourhood were potentially unsafe. When consulting the primary criteria's land use and ownership rankings, the Rock Bay lot scored 4/6, which coincides with the secondary criteria ranking.

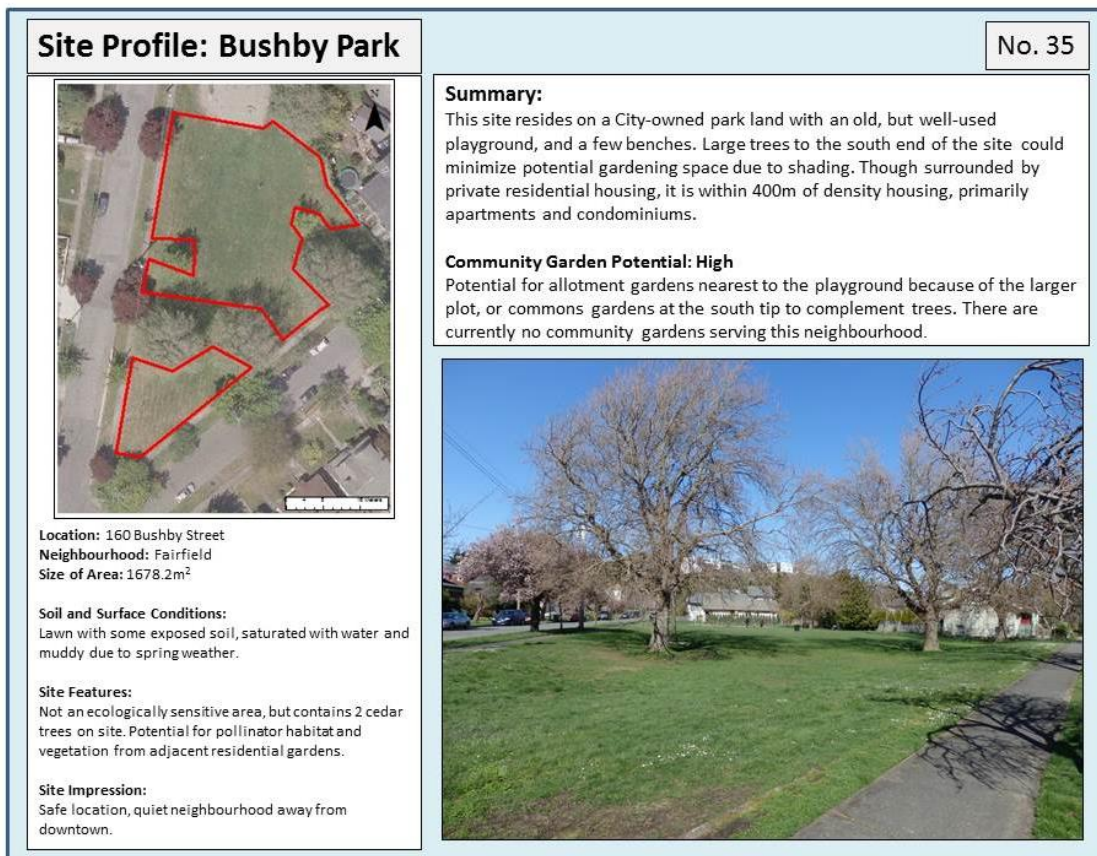


Figure 27: Site Suitability Profile of Bushby Park, site No. 35.

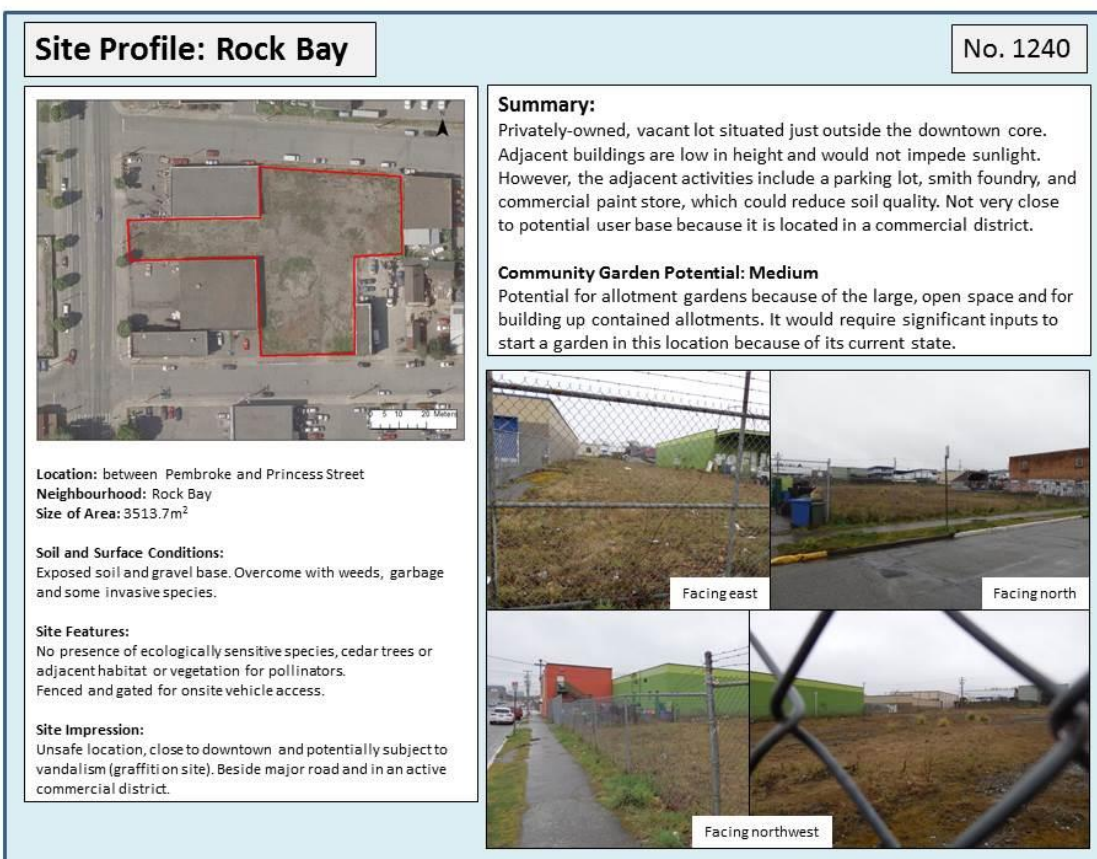
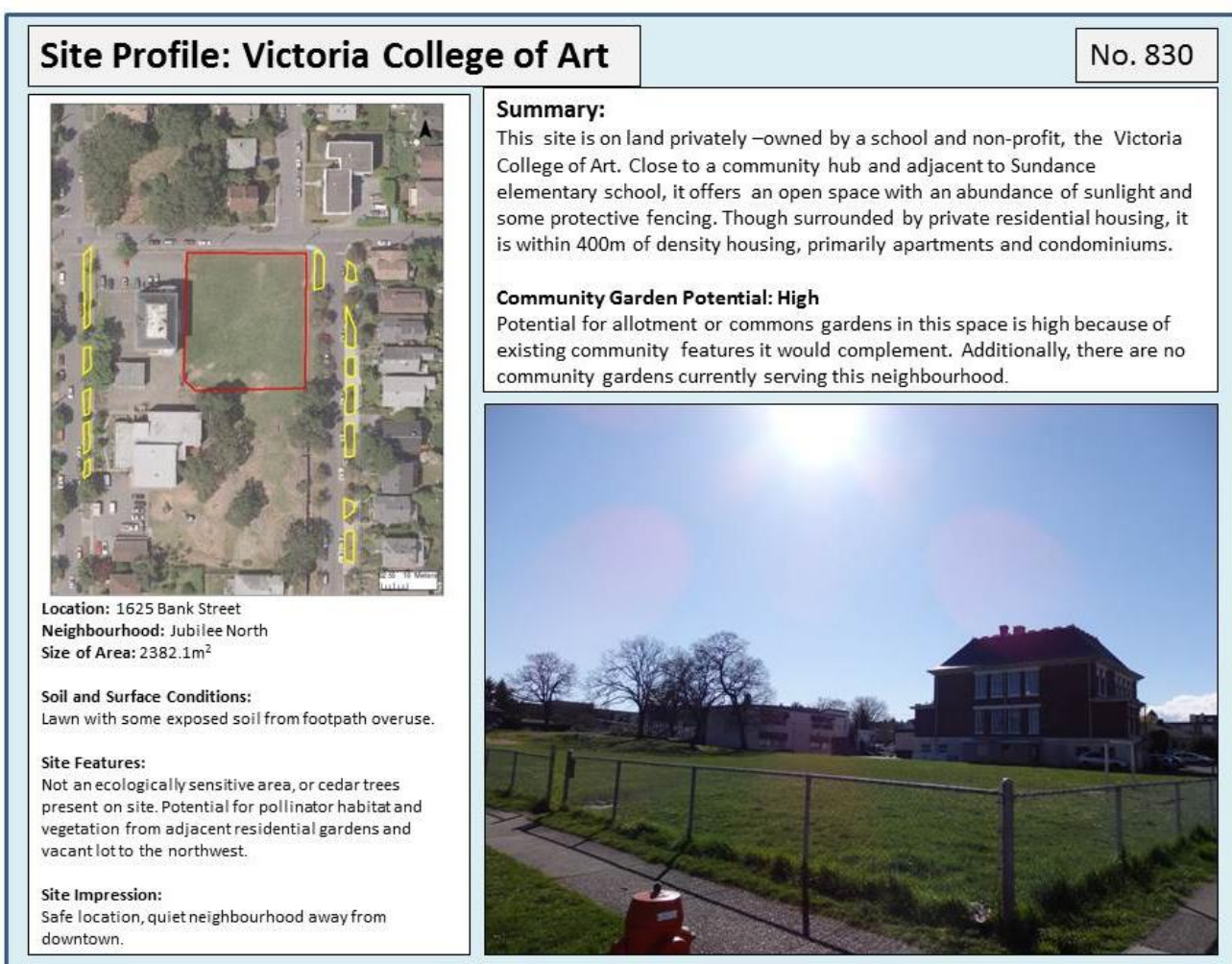


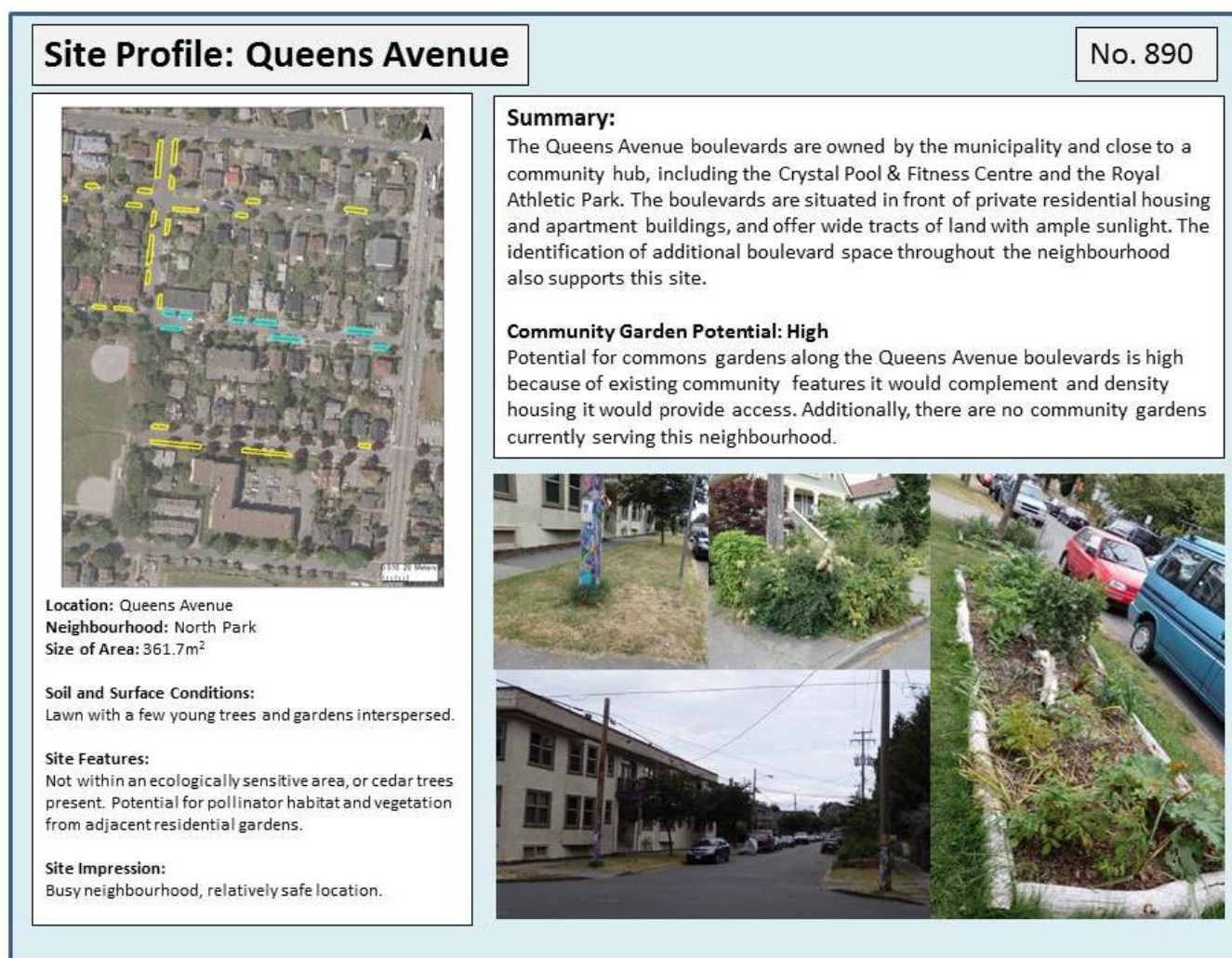
Figure 28: Site Suitability Profile of Site No. 1240 in Rock Bay.

Site number 830 at the Victoria College of Art (Figure 29), scored 5/5 for secondary criteria suitability ranking because it was within 400m of a community hub(1), had ample sunlight(1), was not in an ecologically sensitive area(1) or had cedar trees(1) and had the potential for pollinators(1) from adjacent sites. A community garden at the Victoria College of Art had a high potential because of the open space, existing community features it would complement, and location in a safe and quiet neighbourhood. However, the Victoria College of Art site scored only 3/6 when consulting the primary criteria's land use and ownership rankings because it is an existing school and privately owned. Regardless of the primary criteria's rankings, the site's overall features make it a very desirable and suitable location for a community garden.



**Figure 29:** Site Suitability Profile of Site No. 830 in Jubilee North.

Site number 890 included a cluster of boulevards along Queens Avenue (Figure 30) which scored 5/5 for secondary criteria suitability ranking because it was within 400m of a community hub(1), had adequate sunlight(1), was not in an ecologically sensitive area(1) or had cedar trees(1) and there was the potential for pollinators(1) from neighbouring gardens. For the primary and secondary criteria rankings of land use and land ownership, it scored 6/6 because it was boulevard space owned by the municipality. The prevalence of boulevards acquiring a perfect score may appear biased or an ill-constructed methodological approach, but boulevards often had site characteristics such as open space, proximity to density housing and community hubs, as well as being municipally owned, which made them ideal and opportune parcels of land for commons gardens.



**Figure 30:** Site Suitability Profile of Site No. 890 in North Park.

## Conclusion

Based on the few site profiles completed, the final sites determined by the GIS survey presented suitable options for allotment or commons gardens. While each site had predominantly favourable attributes, ground-truthing was an important step towards confirming the perceived characteristics compared to the actual state of the site, as well as its overall suitability of a site. For example, Site No. 1240 in Rock Bay appeared to be an ideal size and secure site, but closer inspection revealed conflicting activities surrounding the site and vandalism.

Though the sites profiled were ranked only with medium and high potential, this was because most sites had appropriate characteristics and it was difficult draw conclusions based on the suitability rankings. The GIS analysis provided sites meeting the primary criteria, while ranking sites' secondary criteria was more of an observation and consideration than a definitive condition. Furthermore, the social criteria rankings were subjective to on-site observations which made the distinction of their suitability more intuitive than quantitative.

While the rankings' results correctly designate boulevards as priority spaces, the debate remained if boulevards were suitable sites for community gardens. I believe a majority of the boulevards would be difficult to establish as community gardens based on their direct dependency on the adjacent landowners for supporting and maintaining the site. While all community gardens require maintenance and upkeep, boulevards have a more direct association with landowners than a distant parcel of school land or park space because they are often situated in front of a place of residence, such as an apartment complex or home, or isolated in a meridian or roundabout. Despite the dependency on the adjacent landowner's support, identifying sizable pieces of boulevard was still important to identifying space for commons gardens because they represent an unexplored opportunity for community garden space. While this study represents a culmination of site recommendations for community gardens, it is the initiatives and gardeners seeking out space which will determine the efficacy of this UALI.

## Chapter 7: Conclusion

### 7.1 Summary of Research

In response to the globalization of the food system, cities around the world are exploring how urban agriculture can contribute to overcoming the systemic deficiencies of the global food system by localizing the production and consumption of food through community gardens (Brown & Carter, 2003; Shackleton, Pasquini & Drescher, 2009; Viljoen, Bohn & Howe, 2005; Mougeot, 2005; Smit, Ratta & Nasr, 1996; Thibert, 2012). The growing practice and integration of community gardens into a city's landscape provides a means of contributing to food security while reducing the global ecological footprint of a city. However, with increasing competition for land in cities, the lack of available and suitable space for community gardens limits participation.

Since 2006, urban agriculture land inventories (UALIs) have been applied as a tool for identifying land suitable for urban agriculture. For this research, an UALI was applied to the City of Victoria because it experiences food insecurity due to price fluctuations of food, a lack of food self-reliance due to its location on Vancouver Island, and a public demand for community gardening space for allotment and commons gardens. As an active form of urban agriculture in Victoria, community gardens are encouraged by the City of Victoria through policy and community initiatives.

To address the demand for community garden space in Victoria, this study evaluated and developed site selection criteria for identifying land with the potential for community gardens. Subsequently, an urban agriculture land inventory (UALI) was used to identify sites with the potential for community gardens within the City of Victoria.

#### *Methods and Results*

The context of this research was established by completing a literature review of the different types of urban agriculture and examining food systems theory, the concepts of food security and food self-reliance. A literature review also evaluated the characteristics of 19 UALIs completed in other cities, with an emphasis on the



Vancouver, Portland and Nanaimo UALIs. Both literature reviews were used to create a framework for the study and to develop site selection criteria suitable for Victoria.

Potential site selection criteria were formulated based on the literature review of previous UALIs and presented for evaluation during individual interviews with urban agriculture experts from Victoria. The interviewees were invited to prioritize criteria and to consider: 1) a suitable scale of practice, 2) the influence of food security, and 3) the barriers and supports to allotting land to urban agriculture as part of criteria development. The results from the interviews were assessed using a content analysis to identify and prioritize recommended criteria, with a cumulative, multi-criterion evaluation process that included all of the criteria identified in the content analysis. The interview-based site selection criteria were re-assessed for their suitability to be analysed using GIS and site visits. In a subsequent analysis I digitized 1276 parcels of land and considered 5 primary criteria (buildings, heritage designations, sensitive ecosystems, parcels smaller than 139m<sup>2</sup>, less than 6.8 m from water access and 400 m from density housing) and 8 secondary criteria (land use activities and adjacent land use, proximity to community hubs or prominent locations, factors affecting sunlight, soil and surface conditions, presence of ecologically sensitive area (riparian zone, Garry oak), cedar trees, pollinator habitat or vegetation, impression of site safety).

The GIS analysis showed that 1028 sites were unsuitable and that 248 sites had the potential for community gardens. The total area the potential sites composed was 208911.5m<sup>2</sup>. Though the initial digitization captured 35% of Victoria's land base, the final sites represented only 1% of the city's land. In addition, the size threshold of 1189 m<sup>2</sup> resulted in only 35 sites suitable for allotment or commons gardens, while 213 were suitable for commons gardens. This was expected as the literature review noted the Victoria's high population density and interviewees had cautioned a lack of large spaces in the city.

## **7.2 Significance of Results**

The comprehensive methodology and exploration of the decision making process for this UALI satisfied the study's objectives of identifying site selection criteria,

determining sites with the potential for community gardens within the City of Victoria and investigating the barriers and supports to allotting land to urban agriculture.

#### Interviewing Urban Agriculture Experts

The resulting 12 interview participants were composed of 2 urban producers, 4 city planners and 6 community representatives. Though the sample size of urban agriculture experts was small, they demonstrated a diversity and breadth of experiences with urban agriculture. For future research, the qualitative inquiry could be expanded to include the public, in form of discussion groups or open seminars. While only a few UALIs included public input, interviewees emphasized public input as part of the process for developing criteria and selecting sites. My recommendation would be to host focus groups and open houses to create open forum and encourage the public to contribute to criteria development. Increasing the number of interviewees to 30 could also improve upon criteria development by offering new insights while confirming the existing.

#### Barriers and Supports for Urban Agriculture in Victoria

The most prevalent influences determining the allotment of land to urban agriculture were the perception and the awareness of urban agriculture. There was a negative perception that urban agriculture would look messy and attract homeless people to commons gardens, and a positive perception that it would contribute to healthier living and improve the quality of life in a community. Awareness included having access to information regarding city policy, costs and funding opportunities, as well as educational and community resources. These were important factors that encouraged a deeper understanding of the role of urban agriculture in Victoria. The support of City staff, City Council, the neighbourhood associations and community members were also influential, but their positions were difficult to ascertain because they were often contingent upon the specific site in question and motivated by temporal factors such as economic conditions. While the perception and awareness of urban agriculture will continue to change over time, it remains part of a growing global movement towards localizing food production.

Based on my research, I conclude that to encourage community gardens in Victoria there needs to be a community organization to oversee the process of allotting land to community gardens. At present, the task falls to aspiring community members or

neighbourhood associations, most of which take years to navigate through a myriad of policies and steps before gaining access to land. By providing proper administration, there would be a greater opportunity for access to educational resources, tools and financial support for establishing a community garden. Administrative oversight for community gardens would also grant them a greater chance at success because the assistance would help create gardens faster and capitalize on the existing wave of social momentum behind the project. One concern is that the centralization of power has the potential to stifle the initiative of individuals who want to create a commons garden but prefer to act alone rather than have to interact with a larger group.

### Generating and Evaluating Site Selection Criteria

The literature review and interviews generated site selection criteria applicable to the City of Victoria, some of which could not be applied using GIS. While numerous criteria emerged during the interviews, emphasis was given to criteria favoured by multiple participants. The criteria were intended to represent the mixed views of the participants, as contested spaces (such as dog parks, Garry oak habitat, large tracts of land, schools and proximity to major roads) were debated as part of the process of determining suitable site selection criteria. Interviewees were also interested in social factors being included in the site selection criteria which were accommodated through criteria such as density housing and proximity to community hubs. Although including social criteria deviated from the objective of considering purely physical site characteristics, it augmented the ability of the resulting sites to represent the interviewees' interests.

### Mapping Community Gardens: The Role of GIS in Mapping Urban Agriculture

Accurately using GIS systems and manipulating GIS data was subject to the quality of the data available and the experience of the user. While acquiring current and relevant layers to analyse was challenging, the City of Victoria, Capital Region District, Province of British Columbia, and Habitat Acquisition Trust provided layers to consider for evaluation during this UALI. The partnerships and support from local agencies and the government was an important part of acquiring access to data and understanding the extent of digital information available for mapping land use. Since obtaining sufficient

GIS data for conducting the inventory was an issue, having more digital information and layers available to the public, such as soil or existing community gardens locations would increase the knowledge and understanding of land use in Victoria. Furthermore, recognizing the limitations of the GIS data and its availability was important to understanding how accurate the final site selections could represent the criteria.

Though I have basic experience with GIS and a desire to conduct more elaborate analysis, the results achieved during this study were sufficient representations of the final criteria because the base data was provided through manual digitization. Based on my experiences and on the literature review of UALIs, conducting a GIS analysis complements the process of identifying sites suitable for urban agriculture, but it was not required to complete an UALI. As demonstrated by the Vancouver inventory, detailed satellite imagery may be reviewed and confirmed through site visits. However, detailed satellite imagery cannot capture changes in land use, detailed physical site characteristics (sensitive ecosystems) or specific social characteristics such as income levels.

In addition, I believe that conducting site visits often revealed more about a site than the GIS analysis because inventorying sites for community gardens require a detailed profiling of their site and the surrounding area, and a GIS analysis was useful to the extent of determining the scope of the study, but conducting site visits provides more accurate information overall. For future UALIs in Victoria, having a team of individuals to conduct site visits, such as the Portland inventory's team of graduate students, would create a positive feedback loop of information with each site visit's reconnaissance, and would further confirm the validity of any GIS analysis performed during the study.

#### Understanding and Contributing to Food Security and Food Self-Reliance

The site selection criteria also reflected the participants' understanding of the terms food security and food self-reliance, with food self-reliance assuming the most dominant perspective. Participants also prioritized criteria and site characteristics contributing towards food security and food self-reliance. The criteria identified and prioritized for food security were accessibility, proximity to low income populations and community hubs, larger plots and adequate sun and soil. Through the multi-criteria evaluation(MCE), the interviewees' recommendations were included in the final site

selection criteria by considering: proximity to density housing, large plots identified as allotments and the initial digitization considering the availability of sun and soil.

Interviewees also questioned what community gardens actually contributed towards food security in terms of production capacity. Although the area of land involved and the volume of food produced is small in comparison to conventional agriculture, the interviewees' stressed that the contribution is nevertheless significant in terms of quality of food and the impact on participants. Nevertheless, we need to start somewhere. While this is not a physical contribution in terms of production, it represents a social and economic contribution to food security and food self-reliance because people are supporting local production through buying local. The potential contributions of community gardens to the food security of a city have been recognized in studies in Toronto (Kortright & Wakefield, 2010) and Baltimore (Corrigan, 2011). The Toronto study indicates that community gardens contribute to food security "at all income levels by encouraging a more nutritious diet" (Kortright & Wakfield, 2010, p. 39). For future research in Victoria, a survey of the production potential and output of community gardens would help to determine their contributions to food self-reliance and personal food security.

#### Modelling the Decision Making Process of Establishing an UALI

While this thesis provides an effective model for conducting an UALI, this approach could be improved upon by working with stakeholders to define a locality's vision for urban agriculture, define site selection criteria, and share resources; use GIS for coarse, landscape scale analysis; and site visits to verify inventory results.

Collaborating resources with community members, NGOs, educational institutions, the private sector and local government provides an opportunity to recognize multiple goals and visions for urban agriculture. Developing site selection criteria with multiple stakeholders residing in the area of interest through a public process akin to sustainability indicators processes would also help to determine suitable physical and social characteristics to survey. Each group also has access to different resources and can assist with different aspects of the inventory. For example, community volunteers could conduct site visits; the local government could provide GIS data, while the private sector could be a source of financial sponsorship. When seeking funds it will at times be a

challenge to reconcile the values of efficiency, coordination, and planning, held by government and the private sector with community aspirations that are not always aligned.

A GIS analysis should be used to eliminate significant physical barriers and evaluate social criteria when applicable. Most social criteria will be difficult to examine using GIS, therefore conducting site visits and community outreach would help determine suitable areas for potential sites. Though this study profiled a few sites, examining all of the sites remaining from the analysis would be a much more effective measure of their potential for urban agriculture.

The most significant outcome from this research was the development of a comprehensive methodology documenting how to create an UALI specific to an area of interest. In contrast to the previous UALIs, this study used interviews to generate criteria and demonstrate how site selection criteria were prioritized. It provides a model for the decision making process behind establishing an UALI, and contributes to understanding the challenges to allotting land to agricultural purposes in the urban environment.

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## Appendix A: Site Visit Forms

Site Visit Form			
Bureau ID: _____		Site #: _____	
<b>General Information</b>			
Location: _____			
Date Visited: _____			
Surveyor(s): _____			
Current Use: _____			
Adjacent Uses/Nearby Community Resources:			
_____			
_____			
<b>Structures</b>			
Type	Description/Location		
_____	_____		
_____	_____		
<b>Site Details</b>			
	Yes	No	Notes
On bus/MAX line?			
Fenced/Secured?			
Sidewalk?			
Curb cuts?			
Adjacent bike lane/path?			
Adjacent parking?			
<b>Surface Condition</b> (pavement, unimproved, etc.)			
_____			
_____			
<b>Light</b> (trees, tall shrubs, building obstructions, etc.— <b>identify specific location</b> )			
_____			
_____			
<b>Notes</b>			
_____			
_____			

**Figure A1:** Site Visit Form from the Portland UALI (Balmer et al., 2005, p.81).



Site # \_\_\_\_\_

# Site Visit Form

Surveyor(s): \_\_\_\_\_

Date of Visit: \_\_\_\_\_

Location (address, street or intersection): \_\_\_\_\_

Present Land Use (ownership and activities): \_\_\_\_\_

\_\_\_\_\_

Adjacent Land Use: \_\_\_\_\_

Proximity to Community Hub or Prominent Location: \_\_\_\_\_

## Site Sketch

---

Factors Affecting Sunlight (buildings, tree canopy): \_\_\_\_\_

\_\_\_\_\_

Presence of Soil and Surface Conditions: \_\_\_\_\_

\_\_\_\_\_

Site Features	Yes	No
Ecologically Sensitive Area		
Cedar Trees		
Pollinator Habitat or Vegetation		

Site Impression (safe location):

\_\_\_\_\_

## Additional Observations:

---

\_\_\_\_\_

\_\_\_\_\_

**Figure A2:** Site Visit Form

## **Appendix B: Supplementary Interview Questions and Materials**

### **Secondary Interview Questions**

#### **Survey Questions for Community Garden Managers**

- 1) What is the official name of the garden you manage?
- 2) What is the size (area) of the garden?
- 3) How many allotments are there?
- 4) What is the size of an individual plot?

**Table B1:** Attributes to be considered for site selection criteria in the City of Victoria, adopted from the Diggable City’s Aerial Analysis Attributes and Site Visit Selection (2005, p.93).

<b>Criteria</b>	<b>Attribute</b>	<b>Measurement</b>
<b>PHYSICAL</b>	Tree canopy cover	Using the Diggable Cities Ranking of 1-4, based on visual analysis of satellite imagery, the rankings are 0-25%, 26-50%, 51-75%, and 76-100% (See Figure #).
	Presence of a Building	Sites completely covered by buildings will be removed from the inventory. Sites with a building and land available are attributed with a ‘y’ = yes, and sites with no buildings and land available are attributed ‘n’= no. The buildings and their uses will need to be evaluated by the individual bureaus managing the properties (Balmer et al., 2005, p.93).
	Water access	After sites are selected, water mains and access will be determined using data from the City of Victoria’s engineering Water Works Operations. Since the location of water mains was a security concern for the Diggable Cities project, the department handled the data to ascertain the availability of water and attributed the table with a number designating a rank for water availability: 3 = Water Service within the defined area, 2 =Water Main within 25' and 1 =Water Main within 100'. This ranking system can be used for assessing the potential costs of implementing agricultural activities and weighted for making future site selections (Balmer et al., p.95).
	Soil conditions	It is assumed that all gardens will require raised beds due to the cost of testing the soil for contaminants. The history of land use will be ascertained to decide if further work is required for sites selected during the visual analysis.
	Proximity to other UA and green space	Distance from existing UA and green space sites will be considered on the premise that it will enhance the biological productivity of UA, while creating habitat and corridors for pollinators.
	Types of agriculture potential	Assessment of the different types of UA will be based on the size and soil quality of the site.
	Visual impression	Similar to Site Visit Form, from the Diggable Cities, noting the general characteristics of the site via ‘ground truthing’

**Table B1:** Attributes to be considered for site selection criteria in the City of Victoria, adopted from the Diggable City’s Aerial Analysis Attributes and Site Visit Selection (2005, p.93). - *Continued*

<b>PHYSICAL</b>	Impervious surfaces	Concrete or asphalt: Impervious surfaces have been considered for greenhouses, processing facilities, hydroponic Sites for consideration must be at least 465 sq. ft. (Portland) or 5000 sq. ft. (Vancouver). The size requirements for suitable impervious surfaces will be based on the range established for identifying community garden locations in the City of Victoria.
	Access to parking	Spaces for parking to allow site access, and for bringing in tools and equipment. Should not disrupt the neighbourhood.
	Transit	Transit determines access, therefore bus stops will be a maximum ¼ or ½ mile to the site, and bike access will be considered as well.
	Safe Location	A visible, community based garden would encourage public involvement, compared to a site in an industrial location. Safety should also consider fencing, protection from theft vandalism and animals.
	Resources for Funding	The City of Victoria provides the Neighbourhood Greenways Grant and Neighbourhood Enhancement Matching grant intended to fund community projects granted there is proven significant community support before investing.
	Proximity to density or proximity to users	A map of the population density will be overlaid to determine ‘hotspots’, areas of high population density that may benefit from.
<b>LAND USE</b>	1) Primary -City, Crown and Provincial ownership	The primary objective is to identify land owned by the City of Victoria because there is a political impetus to identify sites and develop them towards urban agriculture use.
	2) Secondary -Block ends, right of ways, traffic circles, edges, corridors, institutional or industrial lands	These areas will be considered ‘fringe’ areas, as they will not compose a significant amount of land or be easily assessable. These areas will also be considered as secondary urban agriculture practices such as edible forests or urban orchards.