Assessment of Affordable Housing Options using Collaborative Geospatial Software

by

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

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Abstract

The scale of the affordable housing problem in Canada is enormous and the situation is worsening due to a number of recent social trends. Continued wealth inequality, an aging population, increased immigration, changing marriage and independence trends, and increased part-time employment, have all contributed to a growing affordable housing problem in Canada. Certain groups such as single parents, recent immigrants, seniors living alone and tourism/seasonal workers are particularly vulnerable. In Canada, cities and tourism-based communities have the most pronounced affordable housing shortages, and this is expected to continue in the future.

New and innovative methods of public participation are needed in dealing with the challenges of affordable housing development. Spatial information technology such as Internet-based collaborative geospatial software aims to improve the public participation process. This technology is able to use the Internet, spatial data and carefully designed interfaces in order to engage citizens and increase community participation for difficult planning problems such as affordable housing development.

This thesis focuses on three objectives. The first objective is to define a collaborative, spatially-aware approach to create and assess affordable housing options in Collingwood, Ontario. This approach will use existing spatial data, participants with a vested interest in affordable housing, and an open source geospatial software tool called MapChat. The second objective is to implement the defined approach in a real-world setting in order to generate participatory input. The third and final thesis objective is to examine the spatial patterns of existing affordable housing and the locations generated in the study to determine sites that are most suitable for future affordable housing development in Collingwood.

The results of the thesis show that the approach used provides a proof of concept in the use of Internet-based collaborative geospatial software that can be applied to any town in Canada. Although the approach involved a modest study design, it was able to offer a number of potential advances in planning the locations of future affordable housing. The approach was successful in creating a set of potential affordable housing options, was effective in assessing those scenarios and was feasible to implement in a real-world setting. In addition, the approach had high potential in the generation and management of information and in supporting community participation and empowerment.

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Chapter 1
Introduction

This thesis focuses on the application of spatial information technology to address the problem of affordable housing in the resort community of Collingwood, Ontario. The tool used to address the problem is called MapChat, a collaborative, open source geospatial tool developed at the University of Waterloo.

1.1 Affordable Housing and Wealth Inequality

Affordable housing is a fundamental element in building stronger communities in Canada. It is a key component of a community's quality of life and provides a foundation for obtaining employment, raising children, and building relationships within the community. Affordable housing allows households to have sufficient financial resources to participate fully in the community at large. When affording housing is not available, families make difficult choices between unsuitable housing, and housing that is financially outside of their means. Living outside of their means eventually leads to families being without other human necessities such as food and clothing and can even result in permanent consequences, especially for children. Lefebvre (2003) for example, states that accommodation that is crowded or in disrepair can have negative effects on the health, behaviour, and the development of children.

The Canada Mortgage and Housing Corporation (CMHC) defines Core Housing Need as the number of households which are unable to afford shelter that meets adequacy, suitability, and affordability norms. Affordability, one of the elements used to determine core housing need, is

recognized as a maximum of 30 per cent of the net (after taxes) or disposable household income spent on shelter.

To illustrate the severity of the affordable housing problem in Canada, Engeland et al., (2005, 43) states “In 2001, 15.3 percent of all Census Metropolitan Area households were in core housing need because they were below the affordability standard, that is, because they paid 30 percent or more of their before-tax incomes on shelter and had incomes that were too low to access acceptable housing.” Clearly, housing affordability is a significant problem in Canada, and recent evidence from Morissette and Zhang (2006) suggest the problem is worsening for low-income families because the wealth inequality gap is widening in Canada. The gap between families in the top and bottom 20% of the wealth distribution continued to widen between 1999 and 2005. The wealthiest 20% of families held 75% of total household wealth in 2005, compared with 73% in 1999 and 69% in 1984 (Morissette and Zhang, 2006).

The fact that low income families are unlikely to be home owners places them in a more unstable position relative to home owners in terms of wealth inequality. Morissette and Zhang (2006, 3) note that “Part of the increased wealth among families in the top 20% was fuelled by growth in home equity. In both 1999 and 2005, the vast majority of these families—at least 95%—owned a house. Among homeowners, the median value of the principal residence rose $75,000 between 1999 and 2005, reflecting the sharp increase in housing prices.” Low-income families are therefore forced into a cycle of renting accommodation, staying in core housing need, and continuing to slide in terms of the wealth inequality gap. For many households this gap increases to the point where it is paralyzing, locking those caught in it into a position of permanent renting with no accumulation of housing equity.

1.2 Community Planning and Spatial Information Technology

In today's society, urban and community planners must find a balance for the many diverse economic and social interests in community land development. Finding such a balance is often difficult when the economic stakes are high. For example, householders may defend their residential property values, which they see threatened by an unwanted development, or a big-box retailer may attempt a rezoning against the wishes of local business owners. It has become a major task for planners in any community to mediate such disputes and find solutions that work for all groups or individuals involved.

Historically, disadvantaged groups such as low-income families have not had the financial or political means to have satisfactory participation in the decision making process relating to community development. However, in more recent history various urban reform movements have helped Canadian communities deal more openly and democratically with expansion, ensuring more stability in the provision of services, and maintaining a degree of humanitarian concern for the less fortunate of their citizens. Reforms such as the Kingston Reform Movement focused on urban renewal and rental housing and addressed a general distrust in local democracy (Harris, 1987).

Today, most communities have increased the frequency of public meetings as the method to accommodate viewpoints such as those shared by less fortunate citizens. This approach is widely ineffective however as citizens are often unable to attend meetings held at fixed times and locations and frequently lack confidence in free expression during such meetings (Jankowski and Stasik, 2006). In addition, discussion at public meetings tends to drift off topic or one sensitive issue becomes the focus while many other equally important problems are left out. As a result of the weaknesses associated with public meetings, citizens regularly experience frustration and miscommunication which also leads to mistrust of planners and politicians (Howard, 1998). In the end, the participatory

process deteriorates and potentially important contributions get overlooked. In order to improve public participation in the future, the process must be capable of overcoming citizen disengagement and the perception that the effort of getting involved outweighs any potential benefits (Krek, 2005).

Current literature suggests that community planning can be enhanced through the use of web-based geospatial software to engage a wider cross section of stakeholder groups and reach citizens who seldom participate in the group decision making process (Mason and Dragicevic, 2006). Web-based geospatial software gives, in principle, an equal voice in the process, including nervous citizens, those unable to attend meetings, and those from minority groups or low-income groups, assuming of course that they have access to the Internet. In addition, web-based geospatial software can clearly communicate spatial relationships with maps to participants with little to no knowledge of planning concepts. These tools also provide support in helping decision-makers obtain and analyze valid opinions and create legitimate scenarios for the community planning problem at hand. If appropriately utilized, web-based geospatial software has the potential to exert profound impacts on community empowerment, innovation and social change.

Planning in resort communities usually involves rapid growth and intense land use pressures. Often, highly capitalized housing markets exist, which have considerable potential to completely exclude certain groups from the real estate market. Sadly, groups such as young families entering the housing market may not have a single feasible option to own a home but rather are forced to rent at unreasonable levels. This same young working class can become displaced and in time certain segments of the local labour force disappears. To avoid perpetuating these problems, resort community planning needs to involve all citizens, especially those that are less affluent and under financial strain. A participatory approach is needed that is able to maintain anonymity, and give less

affluent citizens a voice to initiate housing development that is affordable to all residents. Web-based geospatial software has the potential to do this and give all citizens an opportunity to be heard.

1.3 Spatially Assessing Affordable Housing Options

Developing affordable housing is not a simple process. Numerous challenges must be faced in terms of partnerships and regulations. The housing industry in Canada is a complex network of organizations ranging from builders to lenders, manufacturers and suppliers, land developers, real estate agencies, architects, engineers, planners, politicians, non-profit organizations and government agencies. Aligning these bodies is a major undertaking in affordable housing development. In addition to the diverse set of participants involved, all aspects of residential construction, including new home construction, renovation, and delivery of social housing, are conducted within a regulatory environment. This means that building regulations are generally enforced by municipal, provincial or federal departments concerned with health, safety, and quality control of building products. Regulations exist at the dwelling level (fire, health, safety, occupancy, and building code requirements) and at the community level (zoning, site requirements, planning policies, servicing standards, and the planning approval process). These regulations are in place to ensure the quality of housing and living environments in a community, but they result in a lengthy and complex approval process.

The initiation of affordable housing development in a community usually begins with the identification of affordable housing as a problem. Generally, this is derived from collected statistics, from non-profit organizations, by citizen outcry, or even from visual cues such as homelessness within the community. Once the problem is identified the next step involves putting together an affordable housing development team (often called a task force) and identifying potential location

scenarios in which to build new affordable units or to renovate dwellings and target them for low income groups. In order to identify suitable land, an approach is needed to consider all stakeholder involvement, zoning regulations, the function of the community and even aesthetics. Numerous factors need to be considered in this process and a flexible approach is needed. In order to incorporate numerous opinions within the community, integrate substantial amounts of relevant data, and understand the results in a clear fashion, a new approach is needed that would overcome the difficulties associated with locating affordable housing projects.

Collaborative Web-based geospatial software uses the Internet, and carefully designed interfaces in order to create a more level playing field on which to conduct public debate, especially surrounding land use and planning issues. The practice usually involves mapping applications which are able to collect and store local knowledge and facilitate public collaboration and consensus building. In addition, the technology increases the potential to involve a wider range of people (by bridging time and space), and to visualize and organize spatial information. This thesis proposes and utilizes an innovative method using collaborative web-based geospatial software for affordable housing in community planning. The goal is to explore how a newly designed tool called MapChat is able to facilitate two-way communication between participants in creating and assessing affordable housing scenarios in Collingwood, Ontario.

1.4 Research Objectives

This thesis has three key objectives. The first objective is to define a collaborative, spatially-aware approach to create and assess affordable housing options in Collingwood, Ontario. This approach uses existing spatial data, participants with a vested interest in affordable housing, and open source geospatial software. Considering the number of people involved in making affordable housing

decisions in a community, the thesis focuses on an approach that involves a democratic and spatially-aware decision making process. The second objective is to implement the designed approach in a real-world setting by running a hands-on collaborative assessment exercise with recruited participants. The intent is to ensure that participants are comfortable with the software, clear with the tasks to be completed, and eager to input their thoughts and opinions into the use of software relative to the task of identifying affordable housing locations within Collingwood. The third objective of the thesis is to examine the spatial patterns of existing affordable housing and the locations identified in the study to determine locations that are most suitable for future affordable housing in Collingwood. It is hoped that the inspection of existing and potential sites by the community may clarify the urgent need of housing as well as to initiate the first stage in the land delivery process which is the selection of suitable sites.

1.5 Thesis Structure

The thesis is divided into five chapters. Following the introductory chapter, Chapter 2 characterizes the problem of affordable housing in Canada by defining affordable housing and discussing a number of social trends related to affordable housing. Chapter 2 also describes the concept of spatial information technology in participatory planning and how it applies to affordable housing development. Chapter 3 examines the study area of Collingwood, the MapChat tool used in the study, spatial data collection and illustrates the research design used in the thesis. Chapter 4 presents the results of participation analysis, spatial analysis, and comment analysis and also provides a discussion of the results. Chapter 5 concludes the thesis by applying the study results to affordable housing in Canada and presenting recommendations and directions for future research.

Chapter 2
Affordable Housing and Participatory GIS

This chapter discusses a number of key issues surrounding the concept of affordable housing in Canada. This includes an examination of social trends affecting affordable housing, a description of the groups in greatest need of affordable housing and the role of government, non-profit organizations and affordable housing task forces in developing affordable housing. This chapter continues with a description of cities and attractive communities as the most rapid areas of growth and therefore the areas where the affordable housing situation will be the most severe. Community housing design strategies and community engagement are also covered to further characterize the nature of the affordable housing problem in Canada. Lastly, the potential of Spatial Information Technology as a possible solution to be applied in developing affordable solutions will be presented.

2.1 Introduction

Affordable housing is a problem that has plagued planners and city councils consistently for the last two centuries. In addition to the serious distress it causes families who cannot find an affordable place to live, the lack of affordable housing has negative effects on community well-being. It has the potential to create localized labour shortages in certain sectors and lead businesses to relocate due to impacts on supply and demand within the economy (Curto, 2006). A lack of affordable housing can also force workers to commute excessive distances to work, resulting in congestion on the transportation system, higher fuel consumption, and pollution. For workers, commuting also means additional stress, less family time, and decreased participation in community life. At the community

level, a lack of affordable housing means a reduction in the quality of life for all members of the community.

Why is the provision of affordable housing such a difficult problem to solve? The answer lies in the complexity of the problem in both social and economic terms. Creating affordable housing is not as simple as building dwellings for those in need. In economic terms, a complex delivery and financing system must be in place that not only makes housing affordable but also sustainable and fair for everyone involved. In addition, most housing is built, sold and rented through the private sector which is driven by market demand. Therefore affordable housing is not usually considered in the market equation unless incentives or subsidies are involved. Socially, the creation of affordable housing can have many related impacts on a community. For example, the concentration of low income or poverty may result in high levels of unemployment, high school dropouts, teenage pregnancies, increased crime and drug use, and stigma from the broader community (Kazemipur, 2000). On the positive side, if affordable housing developments are socially successful, low-income families have the ability to integrate fully and contribute to the community, while earning respect from other citizens. Thus, affordable housing affects community welfare, the social fabric, and community cohesion (Murphy and Cunningham, 2003).

2.2 What is Affordable Housing?

As noted above, affordable housing can play a major role in overall community well-being. But what exactly is affordable housing? Murphy and Cunningham (2003) suggest that it comprises four measures that can be used to assess the housing stock in a community. First, *accessibility* measures if there is fair and equal access to a resident's choice of housing type and location. Second, *adequacy* measures the quality of the housing and whether the housing is safe and habitable. Third, *availability*

measures the range or diversity of types of housing to serve the needs of all members of the community. Fourth, *affordability* measures whether there is a range of opportunities to rent or own for all members of the community.

The Canada Mortgage and Housing Corporation (CMHC) use the term *core housing need* to identify households that are unable to afford shelter that meets adequacy, suitability, and affordability norms. In Canada, it is clear that adequacy and suitability are not nearly as significant as barriers to housing as affordability. Luffman (2006) suggests that according to the Survey of Household Spending and the CMHC core housing need definition, 95% percent of Canadian households in 2004 lived in suitable housing and 93% lived in adequate housing. Regarding affordability, Luffman further notes that about 14% (or 1.7 million) of households in Canada spent 30% or more of their budget on shelter costs in 2004. Of these, 12% spent between 30% and 50%, and 2% spent 50% or more. In recent years it has been found that determining housing affordability is actually more complex than recently assumed. For example, some households may choose to spend more on housing because they feel they can afford to, while others may have no choice. Many researchers have used detailed spending data to assess affordability since this reflects all household spending priorities (see for example, Pendakur, 2001; Miron, 1984).

Housing affordability is an issue that exists for renters as well as home owners. As Engeland et al., (2005) illustrate in Figure 1, 379,785 people owning homes in Canadian census metropolitan areas (CMAs) in 2001 were in core housing need. Again, suitability and adequacy issues made up a very minor portion of home owners in core housing need and affordability made up the majority at 79%. This further confirms the observation that many households are stretched beyond the income to housing cost norm of 30%. Clearly, with more money allocated to housing, especially among renters, the potential to save as well as to cover other daily living costs adequately decreases. With savings

potential undermined there is reduced likelihood that households, especially those living in rental accommodation and on fixed incomes, will be able to set sufficient money aside to move out of the rental sub-market into the ownership sub-market of the housing stock. Moreover, since this is highly spatially variable, it will affect some communities substantially more than others.

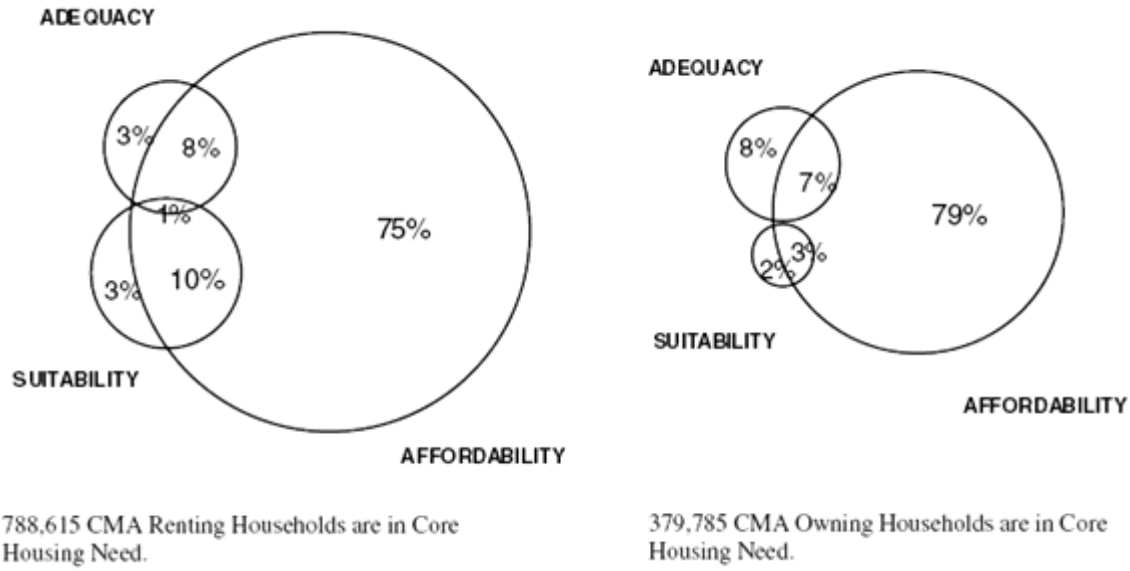


Figure 2.1 - Percentage of households in core housing need below adequacy, suitability and affordability standards
(Engeland et al., 2005)

Although home owners exist in core housing need in Canada, it is clear that renters are much more vulnerable. “In 2001, 30.1 percent of renter households in CMAs throughout Canada were in core housing need, compared to only 8.6 percent of owners. Renters were much more likely to be in need than owners in every CMA. Thus, despite the significant increase in the incidence of core need among owners between 1991 and 2001, renter households in CMAs remained on average 3.5 times more likely than owners to be in need in 2001. In fact, in individual CMAs, renters ranged from being 2.9 to 5.7 times more susceptible to core housing need than owners (Engeland et al., 2005, 44).” One of the key needs is therefore to be able to establish mechanisms, either fiscal or facilitatory, that allow

households to generate either savings or other forms of financial equity to be able to move between the rental and owner-occupied components of the housing stock.

2.3 Social Trends Affecting Affordability of Housing

Affordable housing has linkages with a number of recent social trends that impact directly the severity of affordable housing shortfalls. Continued wealth inequality, an aging population, increased immigration, changing marriage and independence trends, and increased part-time employment, have all contributed to elevating this issue on the national policy agenda. These contributory issues are now discussed.

2.3.1 Wealth Inequality

Wealth provides access to economic resources which can mitigate the impact of unexpected expenses or income losses. Wealth differs from income because it is what one possesses while income is what one earns. Those with a reserve of wealth can liquidate their assets at strategic times to mitigate negative income shocks during economic downturns or initiate forward-looking strategies when the economy is in a growth phase. However, many households are in a cycle of continuous dependency where they cannot accumulate assets or the financial equity to plan for the future. In fact, when housing costs exceed maximum affordability levels, the potential to react to shocks or to plan is substantially reduced. This is particularly crucial for lower income earners, solo mothers, the indigent elderly, those on fixed benefits, or those who have consciously exceeded maximum housing affordability in search of a life style that is beyond their means to sustain.

Compounding these issues it is evident that wealth inequality is on the rise in Canada. In recent years the gap between those in the top and bottom 20% of the wealth distribution has increased.

Morissette and Zhang (2006) indicate that, as measured by the Gini coefficient (an income inequality metric), wealth inequality fell sharply between 1970 and 1977, remained fairly constant between 1977 and 1984, increased between 1984 and 1999, and increased even further between 1999 and 2005. Hence, Canada's wealth dispersion has been trending upwards since the mid-1980s.

The wealthiest 20% of families held 75% of total household wealth in 2005 compared with 73% in 1999 and 69% in 1984 (Morissette and Zhang, 2006). The problem with increasing wealth inequality in societal terms is a pronounced shrinking of the middle class. Yalnizyan (2007, 31) supports this notion by noting that "The rich are getting richer, the poor aren't going anywhere and there are fewer people in the middle to mediate the two extremes. We ignore these trends at our collective peril." For many households, incomes simply are not keeping pace with inflation and, as a result, these households are falling further behind in society. Evidence shows that this group is generally comprised of young families. Picot and Myles (2005) note that the "worrying developments" (of increased wealth inequality) are the declining earnings of younger adults (under 35) and the corresponding impact this has on their prospects and general well being. Roberts et al. (2005) add that poverty and low income are declining among the elderly but are increasing among youth. Young people, below age 30, earn a relatively lower income from work compared to people aged 45 and over or compared to the median income.

Figure 2.2 shows how income for people in the under 25 and 25-34 categories remained stagnant from 1984 to 2005. At the same time, those in all other older categories increased considerably, even in the over 65 category. In the latter case retirement income clearly outstrips the relative gains of younger age groups and this has direct impacts on the ability of the latter to be able to get into the housing market.

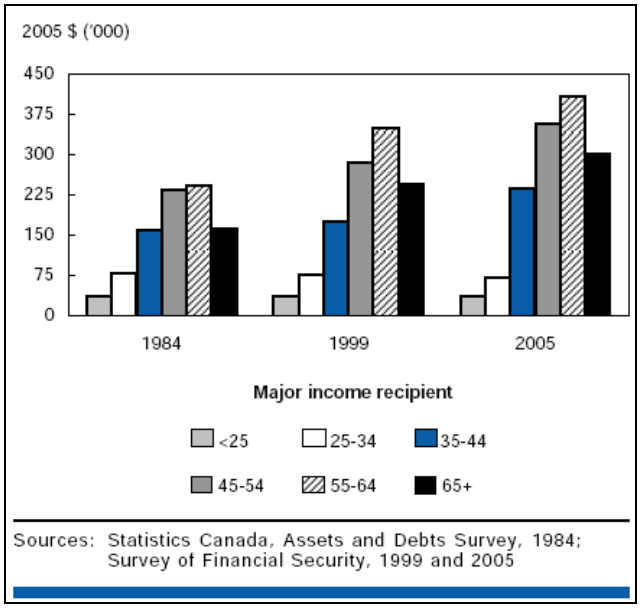


Figure 2.2 – Average Wealth per Age Group 1984, 1999, and 2005

The trends in Figure 2.2 also suggest that older Canadians are staying actively involved in the labour market and holding on to higher paying positions. In this regard, Picot and Myles (2005) mention that although trends in wealth inequality are the result of a complex mix of factors, most individuals receive most of their income from the labour market, either directly (adults) or indirectly through inheritance (children), for most of their lives. Thus, employment levels and the distribution of individual wages and earnings play a primary role in shaping the distribution of wealth.

In addition to income, two other factors can be credited with helping to widen the wealth inequality gap. Home equity and registered retirement savings plans (RRSPs) have been able to make the already well-to-do much better off, while lower income families continue to languish. Morissette and Zhang (2006) note that from 1984 to 2005, the net value of the principal residence stagnated among families in the bottom fifth (of the wealth distribution), but rose about $155,000 among those in the top fifth. Similarly, RRSP and locked-in retirement accounts (LIRA) changed very little in the former group and increased roughly $100,000 in the latter. Over the same period, additional investments in

stocks, bonds, mutual funds and real estate other than the principal residence also contributed to further the wealth inequality gap.

Increased wealth inequality has aggravated the issue of affordable housing because it traps households in core housing need. With a limited supply of affordable housing, the only option is to endure high rental costs, with little hope to improve financially. Yalnizyan (2007), notes that Canadian families are getting better educated, delaying or dismissing the demands of family formation and working harder, however the best the majority gets out of this is to stay in place economically. This seriously questions the direction of the country socially. However, the trend may be occurring on a global scale.

Yalnizyan (2007, 30) sums this up well by stating: "…these trends affect us all, no matter where we sit on the income spectrum. It's not just that the rich are getting richer and there are more of them. It's not just that the middle class is getting a smaller share of a bigger economic pie. It's not just that Canada's bottom half of families have been shut out of most of the economic gains. It's not just that Canada's poorest families appear to be stuck in time, regardless of their increased work effort. It's not just that every category of Canadian family — except the richest 10% — is working harder for their money. It's that all of this is changing the nature of Canadian society in new and unforeseen ways."

2.3.2 A Growing Elderly Population

Demographically, Canada has a composition in terms of age cohorts that reflects trends in other post-industrialized western economies. The proportion of elderly (defined as over 65 years of age) Canadians is the fastest growing age group. For the most part, this is the result of the baby boom, a period of greatly increased birth rate immediately following World War II. Hodge (2003) states that in 2001, there were just over 4 million persons 65 and older, or almost 12.6 percent of the total

population. This represents a growth in the numbers of elderly of almost 30 percent over that of 1986. And, as substantial as it has been in the past, the seniors' surge will be even greater in the future. When the baby boom generation reaches senior citizen status in 2011 – less than a decade from now – the numbers of elderly will grow even more spectacularly until they account for more than one-quarter of the population at 2031 (Hodge, 2003).

The key fact about this generation is their sheer weight of numbers. Foot and Stoffman (1998) mention that other Canadians will have to live with the prominence of this generation until large numbers of its members start dying, a process that won't get underway for about another 20 years. In fact, decreasing numbers of baby boomers may take even longer than that, due to increased life expectancy through improvements in medicine and healthier lifestyles. Beaujot, (1991) notes that in 1867, at the time of Confederation, the average life expectancy of Canadians was 42 years, in 1921 this had increased to 60 years, in 1980 life expectancy was 76 years, and at the beginning of the 1990's Canadian life expectancy was 78 (75 for males, 81 for females).

The aging of the Canadian population already has, and will continue to have profound impacts on every aspect of the countries society and economy. Roberts et al. (2005) suggest that inequality between age groups is increasing and older people (over 50) are monopolizing a growing portion of economic resources. Not only will the healthcare system be affected by this, but other aspects of the economy will also be impacted, especially the real estate market. Foot and Stoffman (1998), suggest that typically couples relocate to a better house or renovate their home during their 40's. The large numbers of aging Canadians at this stage of the life cycle have accumulated wealth and are putting their money into real estate. This, coupled with low interest rates, has caused a real estate explosion in recent years, which has driven property prices upward.

Most major centres in Canada have witnessed a diminishing number of affordable housing units because the aging generation is acquiring property to upgrade either for their own tastes or to earn profit through investment. In this context, CMHC (1999) notes that the active, upscale homeowners want their home to carry the implicit message with their residence that 'Individuals living here have earned this lifestyle' and this message is implicit in the general reluctance for elderly residents to downsize their dwelling after they retire. (Foot and Stoffman, 1998) note that only about 20% of retirees move out of their homes when they stop work (and most don't move far). The other 80% stay put to enjoy their home and garden and because they know the extra space freed up when their children moved out will be useful in the future when grandchildren come to visit. Most people don't trade in their houses for more compact accommodation until they are in their 70s.

Hence, aging Canadians are continuing to have major impacts on the real estate market. Young and low income families unfortunately must become accustomed to the fact that buying a house, especially in a major city, is not necessarily a realistic option until the baby boomers get much older.

2.3.3 Immigration

Canada ranks as one of the largest immigrant-receiving countries in the world. Due to a low rate of natural population growth, it is necessary to attract migrants in order to keep population levels stable and to satisfy the need for labour within an expanding economy. In this sense, immigration is extremely important to the future of the country. However, it creates large a constant flow of new people arriving, typically with little in the way of investable capital and in search of housing that is affordable. A recent report by Strategic Research and Statistics Canada (2005) indicated that in 2001, there were 5.4 million people who were born in other countries and were permanent residents in Canada. They accounted for 18% of Canada's population of 29.6 million. Since 2001, Canada has

welcomed 1.2 million newcomers, pushing the nation's population growth rate to a level higher than any other G-8 country. In fact this year (2007) the Federal Government has set the most aggressive increase for immigration in 15 years, aiming to accept up to 265,000 newcomers - an increase of 5.2 per cent over last year ("Immigration targets go beyond numbers", 2007).

Recent statistics show that one-third of recent immigrant households (who landed after 1985) spend more than 30% of their income on accommodation, and one-quarter of these households have costs in excess of 50% of their income" (Strategic Research and Statistics, 2005). Evidently the situation for immigrants is most pronounced in Canada's largest cities. In Toronto, for example, 43.5 percent of recent immigrant renter households were in core housing need in 2001 (Engeland et al., 2005).

2.3.4 Marriage and Individual Autonomy Trends

Attitudes towards the institution of marriage have changed significantly over time. Not only are marriages failing more frequently, but they are also being delayed. This could be the result of changing preferences ranging from a decreasing faith in the institution of marriage, to increased autonomy whereby individuals don't see their happiness improving with marriage. Clark and Crompton (2006) explain that less formal marriages exist now because young adults are delaying marriage, common-law union is increasingly replacing marriage, there is more divorce, and marriage is no longer a prerequisite to childbearing as more and more children are being born to single mothers or unmarried couples.

Canadian statistics show that the average age at which people marry has increased significantly in recent years. Roberts et al. (2005) note that for first marriages in 1960, brides were on average 23 years old and grooms were 25.8 years old. For first marriages in 2001, the average age of brides was 28.2 years and the average age of grooms was 30.2 years. This delay in marriage obviously shows

changing preferences for young Canadians. The delay in marriage could be the result of people putting off marriage until their education is finished, or waiting to settle into occupations. However, for some individuals there is no intention to marry at all (Figure 2.3). Crompton (2005) confirms this by noting that delaying marriage tends to increase the likelihood that a person will never marry. After age 30, a single person may not wish to marry, as it may seem less feasible, less desirable or less practical than it did when they were younger.

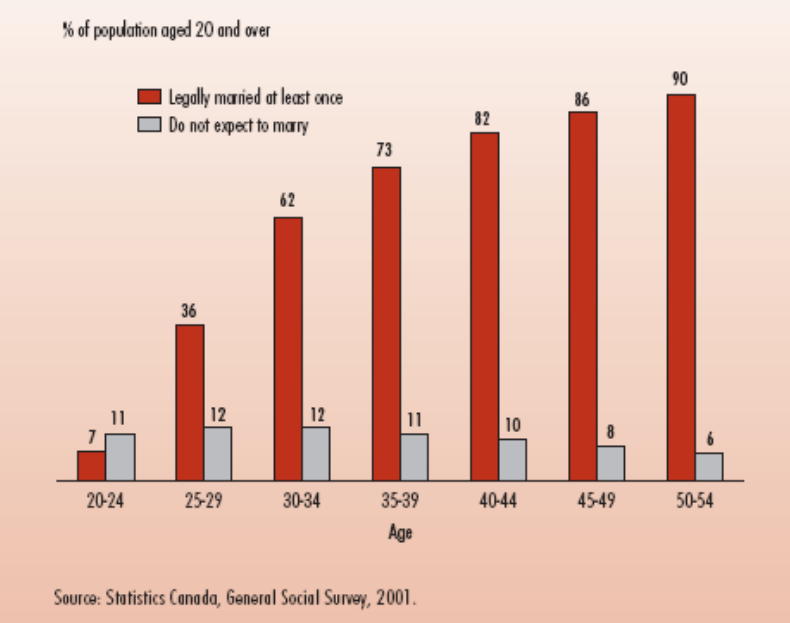


Figure 2.3 - Percentage of each age group who do not expect to marry
(Crompton, 2005)

Canadians who decide to delay or avoid marriage entirely may hold a strong preference for individual autonomy and independence. Peron et al. (1999) confirm this by noting that current trends in household composition and family relationships illustrate that autonomy has become an important value in Canadian society. Also, Peron et al. (1999) mention that in 1960 only 7.3 percent of households were composed of single individuals, while in 2001 24.7 percent were composed of single individuals. This signifies a 3.4-fold increase.

Clearly, independence, privacy and autonomy has gained social acceptance over time, but how does this affect access to housing? Engeland et al. (2005) show that almost a third of (non-senior) renters who lived alone in census metropolitan areas in 2001, were in core housing need. Figure 2.4 demonstrates the severity of the housing situation for those living alone. In the graph, most notable is the prominence of females living alone. The groups of females living alone (non-family households), female seniors living alone, and female lone parents are all significant in size.

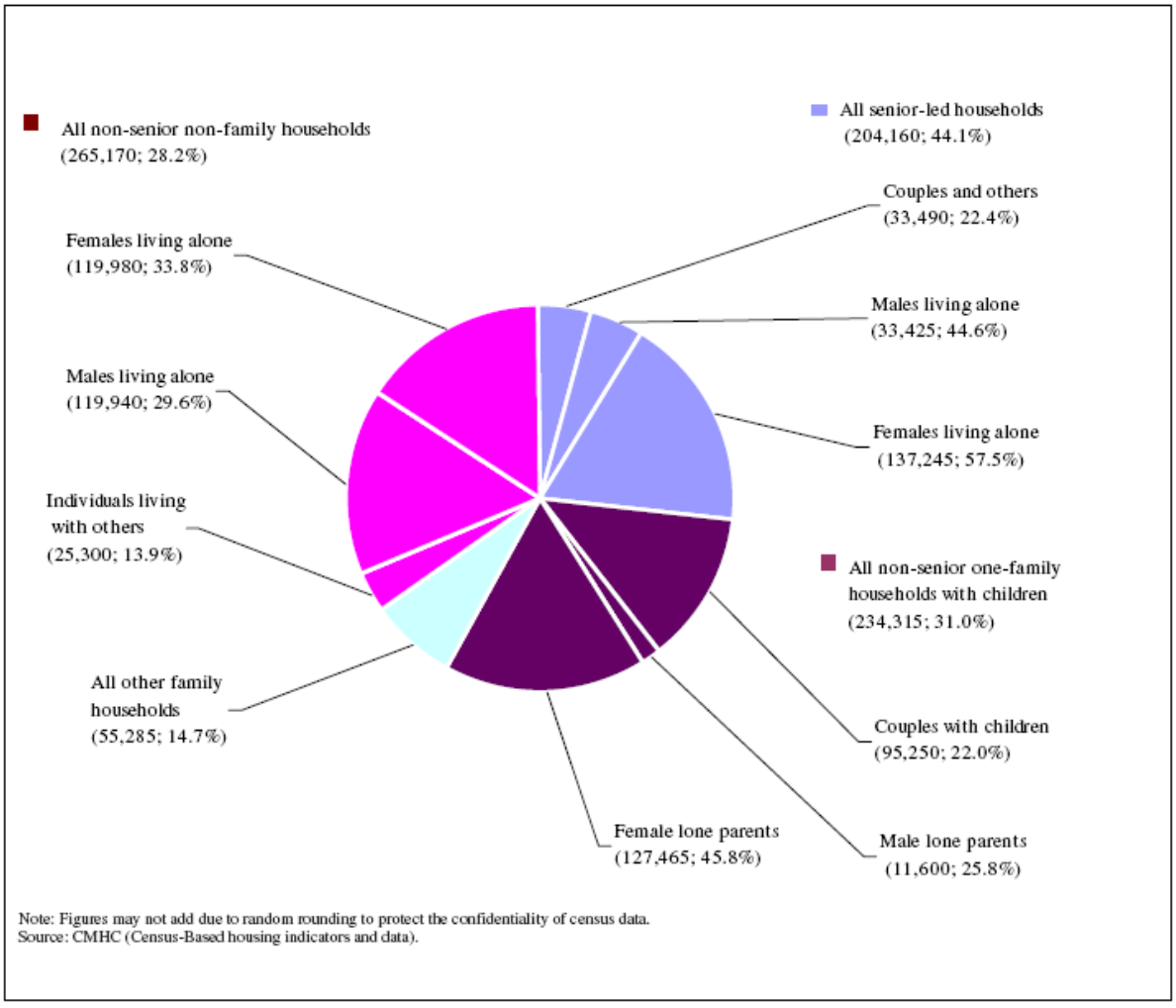


Figure 2.4 - Renter Households in Core Housing Need by Household Type,
(All CMA Totals, 2001, Engeland et al., 2005)

Marriage trends and individual autonomy are contributing to the changing fabric of Canadian society. These preferences are also changing the need for affordable housing. Those without support from spouses are much more likely to be in core housing need than others. Whether this is the result of delayed marriage, divorce, a deceased spouse or simply the choice to remain single, the outcome is the same, namely a much higher need for housing that is affordable.

2.3.5 Increased Part-Time Employment

In recent years part-time employment has grown substantially in Canada. This is the result of a changing employment trends and the increased importance of the service industry. Roberts et al. (2005) state that in 1976, 12.6 percent of those employed in Canada were part-time workers (1.2 million out of 9.8 million). In 2003 the percentage of part-time workers increased to 18.8 percent (2.97 million out of 15.7 million). Over this time period, part-time employment increased by 141 percent, while full-time employment increased only 49.5 percent.

The increase in part time employment seems to have been brought on by globalisation and fundamental changes in the global economy, which favour large retail (and other) corporations for example. Rasmus (2006) notes that in October 2006, Wal-Mart announced it was going to double the number of its workers employed part-time from 20 percent to 40 percent of its total work force, while reducing full-time jobs. Through this process of trimming full-time employment and the need to pay benefits, Wal-Mart will save an estimated $3 billion a year (in wages and benefits) by doubling its part-time work force to a total of 520,000 employees.

Generally speaking, Wal-Mart is just one of many present-day examples of how jobs are being radically restructured toward increased part-time work. Marshall (2000) states that a number of well-known, sometimes interrelated, factors are thought to be behind the widespread increase in the use of

part-time work. A more globally competitive service-based economy has brought technological change to the workplace, extended operating and production schedules, and increased fluctuations in business activities. Thus, firms have been inclined to use more part-time labour than was the case in the past. Employers are able to reduce labour costs, and increase workforce flexibility by decreasing full-time, permanent workers and, in their place, hiring a greater number of workers on a part-time basis. Clearly, this type of job restructuring is profitable for employers. However for employees it is much less favourable. Issues surrounding part-time work, such as job quality, security, pay, and benefits, have all become major topics of concern (Marshall, 2000). In addition, if workers are unable to supplement reduced income potential with additional employment, there is a high risk that housing expenses will become extremely difficult to meet. Employment trends in Canada again point toward an increasing need for affordable housing in the future.

2.4 Groups in Greatest Need of Affordable Housing

As indicated in the previous section, numerous social trends are changing Canadian society and these changes have increased the need for housing that is affordable for specific sub-groups of the population. Certain groups including single parents, recent immigrants, seniors living alone and tourism/seasonal workers are particularly vulnerable and in the greatest need of affordable housing. These groups are more likely to live in housing need because they may earn a low income, be unemployed, underemployed or dependent on the government for all or at least a major portion of their income. For many households, incomes are simply not keeping pace with inflation and families are falling further and further behind the increasing cost of living.

2.4.1 Single Parent Households

Single parenthood may occur by preference as in adoption or surrogate motherhood, but more likely it is an unplanned occurrence such as separation, divorce, death or abandonment of one parent. Regardless, the duties involved with raising children and balancing work by one parent are difficult. Many single parents are not in a secure financial position and as a result may have extreme difficulty paying for housing. Engeland et al. (2005) note that in 2001, 43.0 percent of single-parent renters were in housing need. These lone parent households made up 25.1 percent of all renter households in need. Often single parents, for a variety of reasons, do not work while caring for their children. Engeland et al. (2005) also note that in 2001 nearly four in ten single parents were not in the labour force in Canada and more than half relied on the government for the majority of their income.

Clearly this group of unemployed single parents live either in or on the edge of poverty and spend a substantial proportion of their income on accommodation. Engeland et al. (2005) report that in 2001, 6.1 percent of renter households were in core housing need, spending 50 percent or more of their income on shelter. A look at the characteristics of this group confirms that lone parent households form a large portion of this group and are more likely to experience difficult housing conditions than other households. Among single parent families, female single parents are the most vulnerable, perhaps due to lack of employment flexibility in terms of mobility and hours. Morissette and Zhang (2006) found that regardless of the measure used, female single parent families are by far the most financially vulnerable. In all years from 1983 to 2005, more than 40% of persons in these families were in low income and would have stayed in that state even after liquidating their financial assets.

Hence, single parent families are and will remain to be one of the groups in greatest need of affordable housing. As this group struggles financially, unfortunately the children involved will be negatively affected. If the parent does attempt to work, there may not be sufficient time to be spent

with the children. If the parent does not work there may not be enough money for proper food, clothing and shelter. Either way the situation is a difficult one.

2.4.2 Recent Immigrants

As discussed previously in section 2.3.3, immigration is a major social trend in Canada. As a group, recent immigrants tend to arrive in larger cities where they have support from family or friends (of the same origin) and more opportunities for employment. Despite high levels of education, many migrants are forced to wait for years to have their origin-country qualifications recognized. As a result of barriers in many regulated professions, immigrants are denied the chance to practice their skills in fields such as health care and engineering. Recent immigrants typically struggle with low income service or manufacturing jobs in order to pay the rent and meet other daily living expenses.

In order to survive, a common occurrence for recent immigrants is to increase the number of persons per household to make accommodation more affordable. Strategic Research and Statistics (2005) state that the proportion of households with four or more members is twice as large among recent immigrant households as among Canadian-born households and more than one in five recent immigrant households live in crowded conditions. Among households of very recent immigrants (who landed after 1995), the incidence of crowding is 30%. Recent immigrant families undoubtedly struggle during the initial transition period to Canada and are one of the groups in greatest need for affordable housing. Again, children in this group may be the ones most deeply affected. Even if recent immigrant families are able to afford food, clothing and accommodation for their children, often discrimination exists at school as a result of poor living conditions, inexpensive clothing, or other financial liabilities.

2.4.3 Seniors Living Alone

Seniors living alone are a significant group when it comes to being in need of affordable housing. Clark (2002) reported that in 2001 seniors were the largest group of people living on their own, comprising roughly one million individuals, many of whom were widows. As mentioned previously in section 2.3.4, individual autonomy is a growing trend in Canada and living alone has become common for all age groups.

The decline of extended families means that more grandparents, aunts and uncles who previously would have had a place with relatives are now living on their own. Falling fertility rates and the movement of families to suburbs so that fewer children are living within close proximity has also left many widowed seniors alone. According to Engeland et al. (2005), 54 percent of senior renters in Canadian CMAs who lived alone were in core housing need in 2001 and 57.5 percent of senior women living alone were in core housing need.

As a group seniors in need tend to have a low income, and the source of income is often from the government. Engeland et al. (2005) note that over three-quarters of all senior renter households in need were dependent on the government for the bulk of their income and had average before-tax incomes of under $15,000, almost half of which they spent on housing.

Changing social trends in Canada have lead to more seniors living alone. A desire to be independent and negative perceptions of retirement residences supports this trend. Seniors don't tend to see that life in a retirement residence can be fulfilling and much more affordable, therefore they appear to choose to continue living alone. Unfortunately problems arise because income is often low and expenses are high. This places seniors living alone into a difficult and vulnerable situation.

2.4.4 Tourism/Seasonal Workers

Tourism or seasonal workers are another prominent group that often encounter affordable housing issues. These workers may experience inconsistent annual work hours, low wages and an extremely high cost of living due to the nature of the work. Depending on the type of tourism or seasonal work, household income varies considerably during certain periods of the year. As a result, annual income is quite variable as well. Heisz, and LaRochelle-Côté (2006) indicate that employees with variable annual hours do not maintain a particularly high standard of living, have higher incidences of low income and lower annual earnings. Curto (2006) indicates that tourism employees are usually paid closer to the minimum wage. Usually this is the result of service industry jobs which do not require a high level of expertise or skill level and therefore reward a low level of compensation. In addition to inconsistent work hours and low wages, tourism and seasonal workers often face high living costs due to the areas in which they work. These areas often have inflated rental and real estate prices as a result of the high demand created by tourists. The combination of variable annual work hours, low rates of pay and high living costs mean that tourism and seasonal workers encounter major affordable housing problems.

2.5 Cities and Attractive Communities

In Canada, as in most other countries in the world, urbanization is increasing with individuals becoming increasingly urban-focused in order to take advantage of employment opportunities and an improved quality of life. However, housing is much more expensive in cities and affordable housing can be very difficult to find. Intense urbanization in Canada is putting serious strain on city resources. Some households find it desirable to move to nearby communities where quality of life may improve but city amenities are still within close proximity.

2.5.1 The Growth of Cities

Statistics Canada (2007) calculated that in 2001 over 80 percent of the country's population resided in urban areas (Figure 2.5). The level of urbanization, as traditionally defined, has continued to increase but progressively urbanization is concentrated in the largest cities. Simmons and Bourne (2003) report that during the 1996-2001 census period, metropolitan areas (places with over 100,000 population) grew by 6.2 while smaller urban places (census agglomerations) with 10,000 to 100,000 population, grew by only 1.5 percent. The rest of the country declined in population for the first time in the post-war era.

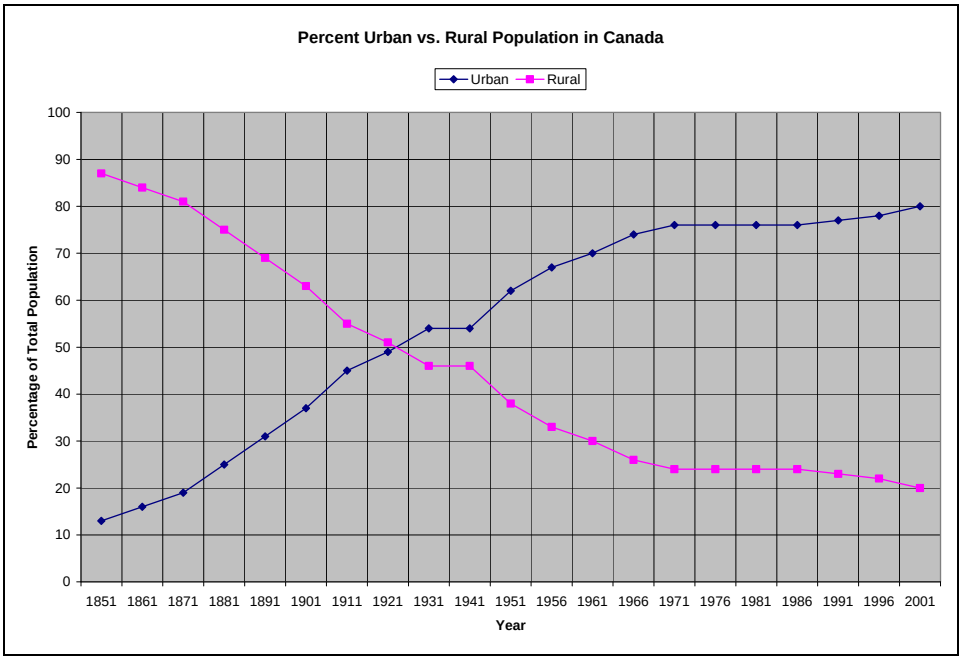


Figure 2.5 - Percentage of the total Canadian population that resides in urban vs. rural areas
Statistics Canada 2007

Some of the most intense urbanization in the country can be seen in an area of southwestern Ontario commonly known as the Golden Horseshoe. Simmons and Bourne (2003) state that the Toronto CMA (4.7 million) and the adjacent CMAs of Oshawa and Hamilton now jointly represent

the contiguous urbanized core of a region that extends over a much larger slice of territory. The total population of this extended urban region is over 7.5 million, making it one of the five largest metropolitan regions in North America. In areas such as the Golden Horseshoe, urban growth has driven up land prices, converted large areas of rural land into development, and overwhelmed the physical infrastructure.

Due to intensification and land use pressures in urban areas, housing costs have also increased immensely in recent years. This continues to drive urban sprawl into the former countryside as people seek less expensive accommodation on the periphery of the urbanized area. For example, in the Greater Toronto Area (GTA), Dunning (2006) states that currently housing costs are continuing to rise and this deflects people seeking affordable housing into the outer ring. In addition, Dunning (2006) notes that if house prices in the GTA remain at or above present levels, a higher proportion of people than anticipated will choose lower-cost housing outside the GTA in the outlying areas of the Greater Golden Horseshoe.

Many consequences exist with this type of development including increased congestion on the transportation system, higher commuting times, higher fuel consumption, pollution and an overall reduction in the quality of life to residents. Once this type of sprawl development is initiated, commuters will continue to go further and further outside of the urban core in order to acquire cheaper housing and achieve the quality of life that they desire.

2.5.2 Counter Urbanization in Attractive Communities

Simmons and Bourne (2003) assert that in Canada there are very few urban places or associated rural areas outside of the metropolitan influence zones that are growing, with the exception of a limited number of recreation and retirement communities in amenity-rich environments. This counter

urbanization phenomenon is also documented in the literature by Davis (1993), Thomson and Mitchell (1998) and Gripton (2006).

One generalisation from this research is that perceived rural amenities play an increasingly important role in the migration decision of urban out-migrants. Amenities such as attractive (natural and built) landscapes as well as peace, quiet, safety and friendliness play a major role in the decision to leave the city. Other recent literature identifies these amenities as contributing to the social construction of an ideal of rural living (Cloke and Goodwin 1992). The result of this construction is the growth of select rural communities that are perceived to embody these valuable rural attributes (Mitchell et al., 2004). The goal that is embodied in moving to attractive communities is to replace the burdens of city living with the perceived benefits of living in a rural environment, while maintaining an urban workplace. Other urban-rural migrants prefer a rural setting and abandon employment ties altogether from their former place of residence. Finally, others move solely for the reason of economic necessity and would not hesitate to return to a larger place if more favourable economic opportunities were to emerge.

Regardless of the perceptions of individuals moving from urban areas to attractive ex-urban communities, the true goal is to experience an improvement in quality of life. Often in the most attractively perceived locations the increase in population through reverse migration leads to a high demand for land and real estate and if growth is not controlled, a number of community problems can arise. Curto (2006) states that affordable housing is often a significant problem in areas with an attractive amenity environment. As competition and prices for housing increases, local residents who earn low incomes may find it progressively difficult to live in the area and they may make way for the ex-urban immigrants by complementing the migratory channel in the reverse direction. This compounds the housing issue at both ends of the migration stream.

One group of individuals impacting on the counter urbanization movement to attractive communities is the baby boom generation. The baby boomers consist of the largest number of owners of country properties, which is why leisure and recreational property has been and will continue to be a strong segment of the real estate market in the future. In this context, Foot and Stoffman (1998) note that there will be enough owners of country property to put considerable pressure on the price of recreational property located within a reasonable distance of our major cities. Aside from owning country property the baby boomers also seek to retire to attractive communities within proximity of major centres. Again, Foot and Stoffman (1998) predicted that as the phenomenon of boomer retirement gathers momentum in the first decade of the current century, there will be a movement from greater Toronto to more distant, smaller cities such as Guelph to the west, Collingwood to the north, and Kingston to the east.

Not only are baby boomers keen to take advantage of the amenities, housing costs and leisure activities in small to mid-sized peripheral cities, but there is also the desire to 'move back home', or to a place that reminds them of home, when they retire. Mitchell et al. (2004) also note that these trends can be expected to escalate in the near future. This will prove to have significant development impacts on amenity-rich communities that are selected for relocation.

Another trend having a considerable impact on counter urbanization to amenity-rich communities involves the information economy. The nature of work itself is changing toward more flexible work hours, more individuals working from home and technological innovation which enhances communication to such an extent that individuals can work remotely from their conventional workplace. These changes all lead to the ability of increasing numbers of households to relocate to smaller communities while continuing to work from home. In the future it appears that the most

attractive and well-rounded communities will experience the highest levels of growth outside of the largest cities (Simmons and Bourne, 2003).

2.6 Key Groups in the Development of Affordable Housing

2.6.1 The Role of Government

Beginning in the 1950s and continuing through the 1970s, the Federal and Provincial governments assumed a very active role in the housing market. They deliberately used new housing construction to stimulate the economy and provide housing for groups unable to access adequate affordable accommodation within the private market (Carter, 1997). Throughout the 1950s-1970s social housing was provided mainly through the public housing programs and financing was provided directly through the Federal housing agency, CMHC.

Van Dyk (1995) noted that residents paid rent based on income, and the difference between this revenue and full project operating costs (including mortgage repayments for owner-occupied housing) was covered by an operating subsidy whose cost was shared between the Federal and Provincial governments. This system worked well for the public, but eventually the Federal government decided to cut costs and restructure the way affordable housing was handled. Consequently it became much less involved in housing supply. In this context, Carter (1997) observed that the provision of affordable housing in Canada was no longer so centred on the government as it was during the first three or four decades following World War II.

In 1975 the federal government introduced rent control which was an undertaking to control increases in the amount tenants were charged by restricting how a landlord can increase rent (Daly,

1975). Rent control was seen as a way to prevent exorbitant rent increases and to assist low- and fixed-income tenants.

Governments at various levels of administration still play limited roles in the housing sector, but these roles, at least for the Federal government and for most of the provinces, is that of a facilitator and manager of existing portfolios as opposed to a provider of new units. The affordable housing that is provided is generally developed on a partnership basis, with community groups or non-profit organizations playing the lead role.

Today government mainly uses its regulatory powers to introduce stability and confidence in mortgage lending and to expand the sources of capital for housing finance. These regulatory powers have been used to promote the widespread use of standardized mortgage documents, mortgage insurance, and the creation of securities that would appeal to investors. The result is a mortgage market that is attractive to both large and small operators and in which uniformly high underwriting standards are maintained. This market has been a significant asset in providing affordable housing in Canada (Carter, 1997), although, as noted earlier, the ability to access mortgage finance at the levels required for entry into the owner occupied housing sub-market remains a major obstacle for many households.

2.6.2 Non-Profit Organizations

In the past two decades, the role of the Federal and Provincial governments in dealing directly with affordable housing has been drastically reduced. Beginning in 1973, the Federal government made amendments to the National Housing Act (NHA) which significantly changed the way affordable housing was provided. These changes fostered the development of a third (non-profit) sector as the principal vehicle through which to continue developing a permanent stock of affordable housing.

Changes in federal policy have lead to a strong emergence of non-profit organizations in developing affordable housing projects in Canada.

In 1973 the Canadian Federal government made amendments to the National Housing Act and created non-profit social housing (Dreier and Hulchanski, 1993). This was a new form of socially mixed non-market housing provided through community-based and municipal non-profit organizations. The program provided assistance, including financial subsidies, to help community groups, church organizations, labour unions, and municipal government become capable housing developers. Since 1973, Canada has built about 250,000 social housing units and almost all new federal expenditures on low-cost rental housing are directed to the non-profit sector for social housing (Dreier and Hulchanski, 1993).

The transfer of duties from the Federal government to non-profit organizations has worked extremely well and for the past twenty years new direct Federal expenditures on low-cost rental housing have been directed almost exclusively to the non-profit sector. This sector is made up of what Dreier and Hulchanski (1993) call “public non-profits” and “private non-profits”. Public non-profits are housing companies established by local government and the private non-profits are established by church groups, unions and community organizations. One of the most remarkable qualities of such groups is their ability to form partnerships within the community. Murphy and Cunningham (2003) observe that community-based housing and neighbourhood preservation programs include efforts in which community members, home owners, tenants, and locally based organizations, often with outside partners, join to improve the stability of the community, the housing stock and housing market, and the quality of life of residents.

Such initiatives include organizing and advocacy to increase the availability and access to decent housing, community and consumer education, and the provision of services or resources needed for

housing. This bottom-up approach lead by non-profit groups in Canada is considered successful especially relative to the United States. In this context, Dreier and Hulchanski (1993) noted that Canada has made outstanding progress relative to the United States in the area of affordable housing supply due to the large non-profit sector which has been nurtured by the Federal government.

Often, community-led approaches to affordable housing shortfalls are coordinated through an affordable housing task force. This is a group appointed by local government who often have a broad range of interests and varying levels of involvement in community affairs. It can include citizens, representatives from the local housing industry, social service representatives, members of council, and staff from municipal and regional governments, and members of the public.

The purpose of an affordable housing task force is usually to explore ways to maintain and enhance the existing affordable housing stock and encourage private and non-profit development of affordable housing. This can include improving the supply of both rental and owner occupied housing and providing opportunities for people to move from rental housing to home ownership with minimal or no reliance on government funding. Sometimes the intent of a task force is to examine opportunities where programs and actions could complement each other, and group initiatives can occur.

The official goals of an affordable housing task force are often relatively similar across communities. In Waterloo, Ontario, for example, the City Council initiated an affordable housing task force in January of 2001. The official goals of the group were to encourage the development of affordable housing; to educate the public about affordable housing; to promote the integration of affordable housing; and too protect and maintain existing housing stock. In addition to having a set of goals and regular meetings, the main objective of the task force was to create a set of recommendations which were presented as a final report.

Some affordable housing task forces make recommendations that involve building a community trust fund, establishing a new housing policy, granting financial incentives to groups who are building affordable housing, and locating high potential sites for future affordable housing development. Initiatives may also recommend the establishment of a tax base levy as a source of funding for many of the future affordable housing programs. Although not many studies have been completed to evaluate the effectiveness of affordable housing task forces, there seems to be an overall positive attitude toward this type of initiative.

2.7 Community and Housing Design Strategies

A number of building strategies can be implemented to make housing more affordable. In this regard, Affordable Housing Ideas (2007) describes a number of strategies such as co-op housing, building housing incrementally (in stages), flexible housing, increasing housing density, reduced unit size, sharing facilities (such as a kitchen and common rooms), using prefabrication in housing, and using volunteer labour in construction. Rather than creating new affordable housing projects, renovation and conversion is often a more viable way to increase the supply of affordable housing. Redevelopment and Renovation (2007) notes that acquiring and renovating housing is often a cost-effective strategy for providing affordable housing and saving up to 40% of the cost of new construction.

Redeveloping areas such as former industrial or commercial land, brownfields, vacant lots, surplus government owned land, demolition and redevelopment, as well as foreclosed property all present opportunities to redevelop sites. Redeveloping sites is advantageous for affordable housing because density increases and existing infrastructure can be utilized. Renovation is another strategy that takes advantage of existing infrastructure. Redevelopment and Renovation (2007) explain that converting

non-residential buildings involves the adaptive reuse of surplus or outmoded buildings such as old schools, hospitals, inns or warehouses into affordable housing.

Converting non-residential buildings is often more affordable than constructing new housing because the building shell is already in place, the building is already serviced and there is usually less neighbourhood resistance. Basement apartments and second suites are another way of providing affordable housing without significant investment. In this context, Affordable Housing Ideas (2007) state that since the 1980s, secondary suites have been recognized by policy makers as one of the most cost-effective ways of providing affordable rental housing. Furthermore, these types of units benefit younger households for whom the extra income makes housing affordable in high cost areas. Lorinc (2006) states that this type of accommodation is energy efficient, intensifies existing residential neighbourhoods and makes better use of municipal infrastructure.

2.8 Community Engagement in Affordable Housing

Hodge (2003) argues that no other local government activity generates more issues of concern to citizens than planning, and of necessity citizen participation in planning comes in many forms. Public meetings, opinion surveys, and advisory committees are some of the formal ways in which citizens participate in the planning process, but the informal reaction of the public against planning development proposals must also be accommodated. Another aspect of the participation process is the democratic responsibility to consult the public regardless of potential conflict. This includes informing the public of changes involving zoning or Official Plan amendments. Usually the more widespread the participation the better the planning decision from an inclusiveness perspective.

2.8.1 The Importance of Community Participation

Sir Patrick Geddes (1854 - 1932), a Scottish biologist and botanist, known for innovative thinking in the field of urban planning may have been the first to emphasise the need to know all of the basic facets of a community before making plans for it. Hodge (2003) notes that the view of Geddes always included the people, the geography, and the economy of the community and the idea that the knowledge of planners should always be shared with the community. Geddes saw the community planning process not only as a logical process for decision-making but also a participatory process.

Public participation has developed into a cornerstone of community planning today. Without open participation, the planning process would cease to be democratic, a gap would exist between those in power and the rest of the community, and planning would occur directly through those considered as experts. It is well established that successful public participation improves the community planning process. Smith (2003), for example, states that there are several reasons for a growing demand for public participation in planning. First, since decisions are complex, all relevant information, views, needs and interests need to be understood. Second, the public has a need to know and to be involved in making decisions that will affect them through greater openness of decision processes. Third, public participation can resolve conflicts and work towards setting group priorities by negotiating tradeoffs and building consensus. Fourth, fiscal responsibility can be increased by sharing costs with partners and establishing the most cost-effective priorities for the community. Fifth, public participation enhances public knowledge, understanding and awareness by sharing information. Finally, legal and policy requirements need to be met and legitimacy increased as participation is fundamental to democracy.

In addition to the reasons stated by Smith (2003), community participation is critical to most planning problems in that they require carefully crafted and often unique solutions with

knowledgeable local input. Hodge (2003) suggests that community consciousness argues for a planning process that not only has more participants actively involved in planning solutions but also has planners working more and more with custom-made plans for particular neighbourhoods, locals, and projects. Although certain planning principles can be applied to a variety of planning problems, each problem requires a unique solution which is only truly realized when based on input from local residents.

Overall, the inclusion of community input can provide much more effective solutions. Isham et al. (1994) indicate that when there is public participation in planning there is a greater likelihood that priority problems will be identified, relevant options will be formulated, and effective interventions will be implemented. Leitmann (1993) and UNCHS (1997) both indicate that the collaboration between decision-makers and citizens within a community yields more comprehensive and more acceptable results than a purely expert-driven approach. Ultimately, residents must contribute to community form and function so that liveability is at its absolute best for residents.

Information sharing is a key component in community participation. In this regard, Walker et al. (2002) suggest that to participate effectively, stakeholders must have access to information pertinent to planning, access to analytical tools required to make effective use of that information, a capacity to use the analytical tools and data sets, and a legislative and institutional environment that fosters effective participation. Hence, community participation relies to a large extent upon information exchange, a process that is generally continuous throughout the planning and decision-making process.

Balram and Dragicevic (2006) state that usually the structuring of group decision-making is conducted in stages involving shared understanding of the decision situation, criteria identification and ranking, data and knowledge availability, and the generation of alternative scenarios. At each

stage, there is a significant exchange of information between planners and the public. Approaches that are able to support the exchange of information will be successful in the future as they are able to improve the planning process and contribute to a favourable end result.

2.8.2 Traditional Community Participation

Many believe that traditional methods of public participation in decision making such as opinion surveys, interviews of key informants, public meetings and open houses simply do not work. Innes and Booher (2000) note that traditional approaches do not provide significant information to public officials that makes a difference in their actions; they do not satisfy members of the public that wish to be heard; they do not improve the decisions that agencies and public officials make; and they do not represent a broad spectrum of the public. Further, Innes and Booher (2000) add that traditional community participation may often antagonize members of the public who try to work through these methods.

Since the public interest is not based on a single view or set of values and local issues are often more controversial than regional or national concerns, local government tends to be the focus of participatory input. In some cases this is mandated through Provincial planning acts. Hodge (2003) also notes that the district school boards, the public utilities commission, and the provincial ministry of highways are some of the other public bodies that become embroiled in participatory planning input. Each has its own mandate to interpret what is in the public interest. However in land-use matters, provincial planning acts across Canada tend to have most influence on the nature and magnitude of mandated public input in matters that relate to planning. Usually, the views of these other bodies are mediated by local government and, nominally, it is the local government structure

(the mayor, council, planning board, planning staff) that is the focal point for implementing public-interest matters in land use.

As noted above, traditional methods of community participation have not proven to be universally successful in generating participation in planning or decision making. Despite efforts in the planning profession to increase community participation there have always been fundamental problems with widespread public involvement. Innes and Booher (2000), for example, state that public hearings at the local level are typically attended only by avid proponents and opponents of a measure affecting them personally, an occasional organized interest group, and a handful of diehard city council or commission watchers. Although there may not always be widespread demand from the general population to be involved in public decision-making, the traditional process requires increased convenience, openness and efficiency, in order to attract a wider audience.

Traditional methods of public participation are often associated with a lack of interest by public officials, insufficient time limits for citizens to speak, an inability to have citizen's questions answered, and an even a failure to confirm that perspectives were heard. Innes and Booher (2000) suggest that these experiences lead to alienation from the political and planning system and contribute to the long term trend of the public disengaging from civic activities. However, even when clear exclusion of certain groups exists, traditional planning practices continue to be used in many instances. For example, women are often excluded from involvement in the planning process because of the time of day meetings are scheduled, due to a lack of transportation, or perhaps the unavailability of childcare (Gurstein, 1996).

Another significant disadvantage of traditional community participation is time commitment. Adding stakeholders to a problem solving effort increases the complexity of decision making and thus the length of time needed to come to a conclusion. There are more meetings and more people with

whom to find consensus, and as the number of stakeholders grows, so does the difficulty of achieving synergy and consensus. For example, Mosvick and Nelson (1987) state that traditional community meetings are too lengthy, inconclusive, disorganized, and redundant. Individuals often get off the subject and certain individuals dominate the discussion which makes for an ineffective and time consuming process for making decisions.

Arnstein (1969) described an eight-rung ladder that comprises the steps for traditional approaches to citizen participation (Table 2.1). Realizing these gradations makes it possible to understand different perceptions of community participation.

8 Citizen Control
7 Delegated power
6 Partnership
5 Placation
4 Consultation
3 Informing
2 Therapy
1 Manipulation

Table 2.1 - Sherry Arnstein's ladder of Participation
(Source: Arnstein, 1969)

The ladder begins at the bottom with (1) Manipulation and (2) Therapy. Arnstein (1969) describes these two rungs as levels of "non-participation" that are contrived to substitute for genuine participation. The real objective here is not to enable people to participate in planning, but to enable power holders to "educate" or "cure" participants. Rungs 3 (Informing) and 4 (Consultation) progress to levels of "tokenism" that allow the have-nots to hear and to have a voice. However, too frequently the emphasis is placed on a one-way flow of information (from officials to citizens) with no channel provided for feedback and no power for negotiation. The most frequent tools used for such one-way communication are the news media, pamphlets, posters, attitude surveys, neighborhood meetings, and public hearings. What citizens achieve in all this activity is that they have "participated in

participation” and what powerholders achieve is the evidence that they have gone through the required motions involving "those people."

Rung 5 (Placation) is simply a higher level of tokenism because the ground rules allow have-nots to advise, but decision rights are retained for the power holders. An example of a placation strategy is to place a few hand-picked "worthy" participants on boards of community action agencies or on public bodies like the board of education, police commission, or housing authority. If they are not accountable to a constituency in the community and if the traditional power elite hold the majority of seats, the have-nots can be easily outvoted and outfoxed.

Generally speaking, further up the ladder are levels of citizen power with increasing degrees of decision-making input. Citizens can enter into a Rung 6 (Partnership) that enables them to negotiate and engage in trade-offs with traditional power holders. They agree to share planning and decision-making responsibilities through such structures as joint policy boards, planning committees and mechanisms for resolving impasses. With these inputs, citizens have some genuine bargaining influence over the outcome of the plan (as long as both parties find it useful to maintain the partnership).

At the topmost rungs, (7) Delegated Power and (8) Citizen Control, have-not citizens obtain the majority of decision-making seats, or full managerial power. At this level, the ladder has been scaled to the point where citizens hold the balance of power to assure accountability of the program to them. Similar to a union, certain groups such as ratepayers associations may have the ability to achieve this level. To resolve differences, power holders need to start the bargaining process rather than respond to pressure from the other end. Arnstein’s ladder clearly shows the true conceptualization of reality in public participation. The lowest levels of the ladder are not truly genuine and simply attempt to make the public feel comfortable that they are involved.

2.8.3 Community Acceptance of Affordable Housing

Not in my back yard or NIMBY syndrome is an acronym used to describe a trend in which community residents oppose developments they believe to be inappropriate for their local area. This could the development of residential or commercial property, infrastructure development (highways, power plants, electrical transmission lines, wastewater treatment plants, landfills, prisons) or when parties build, or operate culturally unfamiliar functions such as subsidized housing, alternative lifestyle communes, group homes, or religious facilities. With regard to affordable housing development, NIMBY syndrome is a prevalent phenomenon.

CMHC (2006) suggest that many people raise concerns about affordable housing development out of a fear that a project will draw an element to their neighbourhood that they consider to be undesirable or unsafe, such as low-income individuals and families, at-risk youth, and people with physical or mental disabilities. Decreasing property values may also be a significant concern. In many cases, there is a lack of knowledge or information about a project or its residents that underlie resident concerns. In some cases, the concern is the impact of growth on the community and in other cases opponents make only some of their concerns visible. Table 2.1 outlines a list of possible community concerns regarding affordable housing projects.

Awareness

- Lack of awareness about the project, contributing to unease when the idea is broached
- Lack of information or knowledge, or both
- Misconceptions about the proposed function of the structure

Concerns about New Residents

- Concerns that new residents would negatively affect community safety
- Concerns that the new project would attract an "undesirable" element
- Discrimination against the new residents
- A misinformed connection between low-income families and crime

Property Values

- Concerns about property values being negatively affected
- Concerns about high-density housing, with fears of crime or the lowering of nearby property values
- Concerns that affordable rentals would be sold off once approval for the project was granted
- Demand for market-driven rather than low-income housing

Community Impact

- A different vision for the proposed site location
- Concerns about increased traffic
- Aesthetic concerns – structures would not fit with existing residential buildings

Table 2.2 - Common Community Concerns for Affordable Housing Projects

(Source: "Gaining Community Acceptance of Affordable Housing Projects and Homeless Shelters, CMHC, 2006)

CMHC (2006) suggests that a number of strategies can be used to gain community acceptance. First, early, open, frequent and clear communication is critical. Communication should demonstrate the value of the project, educate and inform the community, maintain a regular flow of information and focus on the facts, not the arguments. Second, to gain community acceptance of affordable housing projects, the media must be used effectively. This means that affordable housing advocates must maintain regular contact with the media in order to ensure the project is "front and centre" in the mind of the community. Third, relationships with local politicians must be developed. This includes consulting with local politicians early in the process to gauge support and identify political "champions" who can act as intermediaries. Fourth, a clear plan must be created in order to gain community acceptance. This involves knowing the history of the site and the community context surrounding it, clearly defining all aspects of the project before building and developing a community relations and communication plan. Fifth, the community process must be understood. This means

understanding existing zoning regulations and local bylaws, working with city staff to identify potential pitfalls and working with those who have previously successfully gained community acceptance. Finally, persistence is vital in gaining community acceptance for affordable housing projects. This means that all supporting groups must maintain momentum within their own organizations, and within the community.

Community acceptance is often the biggest hurdle to overcome in successfully creating affordable housing. If the proper steps are taken to inform and work with the public as outlined above, the development of affordable housing can speed up significantly and the entire process will undergo much less friction from within the community.

2.8.4 Traditional Participation in Affordable Housing Development

Affordable housing development is similar in many ways to other planning problems. As suggested earlier there is an overwhelming problem with perceptions that involve NIMBY. One of the biggest problems involving traditional participation is that the process is often unable to present an accurate visualization of the project and its implications to the community. As a result, any unknowns may translate into negative feelings toward a development.

Another problem within the realm of traditional participation is a widespread absence of participation from those residents who are in need of the proposed housing. This obviously could stem from feelings of embarrassment or lack of trust in the planning process, but it could also involve the fact that those in need may have a broader set of immediate personal and social challenges that take priority over participating in the planning process. Hence, traditional participation in affordable housing development seems to be particularly ineffective at bridging the gap between those in need and the rest of the community. New methods are needed which can provide a comfortable forum and

present realistic and appealing visualizations for participation in the planning of future affordable housing projects.

2.9 Spatial Information Technology in Participatory Planning

The emergent complexity of land-use problems is a challenge for environmental management, planning and decision making alike. Andelman et al. (2004) suggest that approaches that consider collaboration, data partnerships, and knowledge management can provide an effective means to manage the complexity of environmental systems. These approaches are now considered.

2.9.1 Internet Technology and Community Participation

The ability of the public to participate effectively in the planning process depends on a variety of circumstances and access to resources. Carver et al. (2001) comment that it takes time, familiarity, confidence with bureaucratic procedures, personal contacts in key places, money for campaigns, and private transport in order to attend meetings. All of these factors play key roles in whether the public can or cannot be involved in the participatory process. Although this situation may not appear to encourage participatory democracy, Howard (1998) states that evidence from some countries suggests that technology may have a leading role to play in the way the public participate in the everyday running of their communities. Al-Kodmany (2002), suggests that the Internet as a medium of communication will be increasingly utilized in all aspects of planning. The Internet is valuable on its own as a low-cost mode of communication for participatory planning but it becomes particularly powerful when it is used to distribute and disseminate other visualization technologies. The Internet paves the way for community participation improvements in local planning.

Internet technologies are transforming community participation through the use of “single-user” methods as well as “collaborative” methods. Single-user public participation often utilizes Web-based surveys or feedback forms where citizens enter comments in response to questions and submit their responses using a standard Web browser. Many times this type of participation is accessed from a centralized web portal which is relatively easy to navigate. Crow et al. (1997) indicate that standard Web browsers are tools with no direct support for a group of people to interact and to engage in conversation over that information. However, a number of basic advantages exist such as freedom regarding time and place as well as low costs and anonymity.

Li (2006) identifies several key Web technologies that have played or will play a significant role regarding collaboration in planning decision making. These include software architecture, Web mapping/GIS, Web 3-D technology and Web-based groupware. Normally the software architecture of the Web is based on a simple client/server model. This model allows a user to request information from a Web server, the server processes that request, sends a response back to the user, and the connection between the user (client) and the server is then closed. Li also notes that standard client/server architecture may be suitable for asynchronous collaboration over the Internet. However, it is often augmented to support synchronous collaborations which require maintained connections and direct communications between peers in a collaboration session.

Software architectures able to support synchronous collaboration include centralized, replicated and hybrid architectures. However, Roth (2000) indicates that recent trends favour hybrid architecture because they are able to accommodate different architecture requirements at different collaboration stages. Li (2006) notes that the technology for Web mapping/GIS has evolved greatly from early static map publishing/mapping based on embedding map images in hypertext documents. Significant contributions such as geographic markup language (GML), scalable vector graphics (SVG), and

Internet Map Services (IMS) have improved Web-mapping capabilities immensely. However, these technologies will continue to progress over time.

Web 3-D Technology is an interesting Internet technology contributing to collaborative community participation. With this technology 3-D GIS models can be viewed, controlled and manipulated in a collaborative environment via the Internet. Manoharan et al. (2002) indicate that although these systems are designed for supporting 3-D collaboration for other application areas such as mechanical design, they can be applied as a 3-D collaborative platform to build Web-based collaborative planning and spatial decision support systems.

Groupware technology is yet another Internet technology for community participation. Li (2006) reports that this technology provides computer-based support for both collaboration and communications among multiple participants. Li (2006) adds that groupware may exist as information sharing and idea exchange through e-mail and messaging systems, interactive group decision support (electronic brainstorming, consensus voting, and evaluation of alternatives), or decision making workflow process coordination. Also, it is interesting to note that there appears to be a trend towards the integration of geographic information systems (GIS) and groupware technology, to combine the strengths of each technology into an even more powerful Internet based collaboration tool.

Howard (1998) notes that experience from North America suggests that there are many advantages to Web-based participation. Planning meetings are not restricted by geographical location, and access to information about the issues being discussed is available from any location that has Web access at any time of the day, thus avoiding the problems associated with holding meetings in the evenings. With a Web-based system, the public is at the end of an Internet connection that enables them to make comments and express their views in a relatively anonymous and non-confrontational manner when compared with the traditional method of making a point verbally in front of a group of relative

strangers (Carver et al., 2001). The Internet has the potential to re-engage the public in participatory processes if it is used correctly and legitimately. It has the ability to provide equal access to those who wish to participate using a comfortable medium for exploring issues and innovative ways to visualize and share information.

2.9.2 Participatory Geographic Information Systems

In recent years the popularity of GIS has grown considerably in numerous disciplines such as business, insurance, real estate, defence, education, engineering, government, natural resources, transportation and utilities. Many of these areas have at their core a significant spatial element which is best represented within a GIS because of its ability to store and manipulate spatially referenced data. Spatial data often exists as series of layers, each containing features related to the real-world. Extensive GIS operations exist to analyse these layers such as data modeling, proximity analysis, or network analysis. GIS have been credited with major advances in the storage of spatial information and having powerful capabilities to analyse large amounts of spatial information for significantly improved spatial decision making (Balram and Dragicevic, 2006).

Despite the benefits that GIS deliver to a wide range of disciplines, some contend that GIS has a major weakness. Monmonier (1996), for example, argues that GIS have been accused of being an elitist technology, giving more power to those people already possessing power and depriving those (namely the general public) who lack such direct forms of information access.

An emerging innovation that seeks to combat the undemocratic nature of traditional GIS is Participatory GIS (PGIS). PGIS usually uses the Internet, and carefully designed interfaces in order to create equality for conducting public debate, especially surrounding land use and planning issues. The practice of PGIS usually involves mapping applications which are able to collect and store local

knowledge and facilitate public collaboration and consensus building. For example, users may view and annotate maps, examine input from other participants, communicate directly with other participants, and view maps in real-time showing the accumulated responses of all participants. Collected local knowledge and collaboration are highly valued in PGIS and are incorporated into the formal decision making process, often resulting in community empowerment (Hawthorne et al., 2006; Elwood, 2006). A great deal of optimism should exist for PGIS as it may provide common place mechanisms for public exploration, formulation of decision alternatives, and close involvement of the public in the planning process.

Balram and Dragicevic (2006) define PGIS as a general concept which includes both 'Group Spatial Decision Support Systems' (G-SDSS) and 'Public Participation GIS' (PPGIS). G-SDSS deal with the effective use of GIS by small groups consisting of technical and local experts (Balram and Dragicevic, 2006). The goal is to integrate theories, tools, and technologies to structure human participation from these groups for the purpose of solving a particular spatial decision problem. PPGIS, on the other hand, deal with the effective use of GIS by the general public and community groups. This often involves larger (often marginalized) groups that traditionally have little voice in the public arena. The idea behind PPGIS is empowerment and inclusion through more general geographic technology education and participation.

Al-Kodmany (2002) suggests that PPGIS aims to improve access to GIS among non-governmental organizations and individuals especially those who have been historically under-represented in public policy making. Although somewhat different in nature, both G-SDSS and PPGIS are able to address common problems associated with traditional planning. For example, traditional community meetings often encounter overemphasis on social-emotional rather than task activities, failure to adequately define a problem before rushing to judgment, pressure constricting creativity felt by subordinates in

the presence of bosses, and the feeling of disconnection/alienation from the meeting (Nunamaker et al., 1993).

Both G-SDSS and PPGIS offer the potential to overcome these pitfalls by providing a more structured forum for discussion with the aid of geographic information and maps. In this context, Jankowski (1997) notes that the attractiveness of a computer-supported group approach to spatial decision-making involves the possibility of engaging diverse participants as competent stakeholders through computer-mediated communication, problem exploration, and negotiation support.

Research in the area of PGIS covers a range of geo-spatial tools and techniques such as 3D models, orthophotos, global positioning systems, map-linked multimedia information systems, and geographic information systems. These tools are used as interactive vehicles for spatial learning, discussion, information exchange, analysis, decision making and advocacy. Corbett et al. (2006) describe~~s~~ a number of recent applications which implement existing PGIS tools. One approach uses digital video, audio recording, digital photos and written text to document traditional knowledge which is then stored on computers. It is managed and communicated through the interface of an interactive map. Another approach uses Participatory 3D Modelling (P3DM) and participatory orthophoto mapping to support collaborative resource planning and the documentation of cultural heritage (Corbett et al. 2006). Other approaches incorporate locally relevant and spatially detailed information (gathered through focus group discussions, field observation with community members, and visual image interpretation of satellite images and air photos) for multi-stakeholder decision-making in land use planning (Corbett et al., 2006).

Conceptually, the range of existing PGIS tools are best described by their potential capabilities. Examining these capabilities is important because it allows one to see the range of possibilities in the field of PGIS and perhaps areas for growth in the future. Laurini (2001) discusses several functional

capabilities. First, “Group Communication” involves the generation and collection of ideas through anonymous input and the identification of common ideas. Group communication tools may include data/voice transmission, electronic voting, electronic white boards, discussion groups, computer conferencing, and public computer screens. “Information Management” is another capability which involves storage, retrieval and organization of data. Tools to manage information within PGIS include spatial and attribute database management systems. “Graphic Display” involves spatial and attribute data visualization. This can be achieved through the use of shared and individual computer displays of maps, charts, tables, images and diagrams. “Spatial Analysis” deals with the use of basic analytical functions and includes tools which are able to execute operations for proximity, buffering, overlay, data analysis and data mining. “Process Models” are descriptive/simulative models of physical and human spatial processes. Tools and techniques such as GIS-embedded models, specialized models linked to GIS visualization models, intelligent agents, expert systems, and knowledge bases are able to describe process models. “Advanced Spatial Visualization” involves tools that are able to create virtual realities and multimedia animations. “Decision Models” utilize various decision rules and integrate individual and group derived evaluation criteria with alternatives performance data. Tools such as multi-criteria decision support techniques are considered decision models. Lastly, “Structured Group Process” involves facilitated/structured group interaction or brainstorming. Tools for structured group process include automated Delphi, nominal group technique, and electronic brainstorming.

PGIS tools are currently being developed to improve group communication, information management, graphic display, spatial analysis, process modeling, decision modeling, and structured group process. Improvements in theses areas are a significant contribution to land use decision-making because they are issues that determine the efficiency and effectiveness of the decision-making

process. For example, graphic display, spatial analysis, and process modeling are able to enhance education and awareness of land use problems for citizens. Group communication improvements are able to address individual and project time restrictions by allowing citizens to express opinions online, having questions answered online, and having citizen information transferred to decision makers rapidly. The issue of generating “useful” information to decision makers is also addressed through PGIS capabilities. Information management, decision modeling and structured group process capabilities in particular are able to record and structure group input in an automated fashion to produce meaningful summary reports for decision making. PGIS tools provide ways to considerably improve traditional avenues of communication and understanding and increase the efficiency in building consensus.

Technology has evolved immensely in the past decade. In many ways technology-based tools and techniques provide a foundation for future progress in many fields. Geospatial technologies such as PGIS tools are significant to the field of land use planning because these tools form new methods to conceptualize and discuss the space that we share. Not only are citizens and decision makers able to communicate more rapidly using the Internet, but they are able to investigate space using accurate spatial information and even explore underlying perceptions of that space such as NIMBY. The way in which PGIS tools are able to collect and manage local knowledge and opinions adds an entirely new set of information to spatial features. This is significant to the field of land use planning because it goes beyond physical space and delves into psychological and social constructs of space. This type of progress could form an important component for future development in the field of land use planning.

Numerous advances are shaping the field of PGIS. However, despite recent advances, there are a number of issues that remain unsolved using new tools. The most significant issues include

accessibility, ease of use, and incorporating subjective information with quantitative GIS data. Carver (2003) maintains that there will always be a significant proportion of the population who do not have equality of access and the appropriate training or intelligence with which to use PGIS effectively. Thus, tools that are able to simplify accessibility and usability may begin to address the issues stated above. Carver (2003) also adds that many existing GIS data models may be able to cope with the quantitative and deterministic aspects of space, spatial scale and distance, but may not be best suited to representing the more qualitative and perceptual effects of place since this is more of a personal construct. Therefore opportunities for improvement in existing tools lie in the development of interfaces and data models that can handle personal ideas of place and express opinions or feelings about particular issues and decision problems.

Carver (2003) identifies several future research directions within the area of PGIS. In terms of building upon existing strengths, PGIS needs to raise awareness among decision makers about the potential of geographic information-based participation, incorporate additional local knowledge into GIS databases, further research into methods of communicating geographic information to the lay public, and provide more practical real-world applications of PGIS. Carver (2003) explains that despite research initiatives in both North America and Europe, there still seems to be a significant gap between the experimental and the practical application of PGIS. The number of mapping-based web sites has exploded in recent years but there are still comparatively few instances of real-life usage of this technology within participatory exercises. The reasons for this are not clear but are likely to include political difficulties, lack of resources and expertise, the fact that the public at large are not ready to use PGIS tools, or simply that the tools still may be inappropriate.

The concept of the public participation ladder developed by Arnstein (1969) was discussed previously in Section 2.8.2. The ladder focused on several levels of citizen power in community

participation with increasing degrees of decision-making input. Although still relevant today, the ladder has been revised several times. Weidemann and Femers (1993), and Kingston (1998), for example both make adaptations to the public participation ladder concept in the hopes of increasing relevance of the ladder. Despite adaptations, the ladder was still unable to accommodate the many new forms of public participation resulting from information and communication technologies, and the Internet. Laurini (2001) affirms that technology has implications at two levels of public participation, including exploration and communication between actors as well as analysis and deliberation between actors. Due to the many implications that technology offers public participation, Smyth (2001) introduced a further refined participation ladder, termed the e-participation ladder (Figure 2.6).

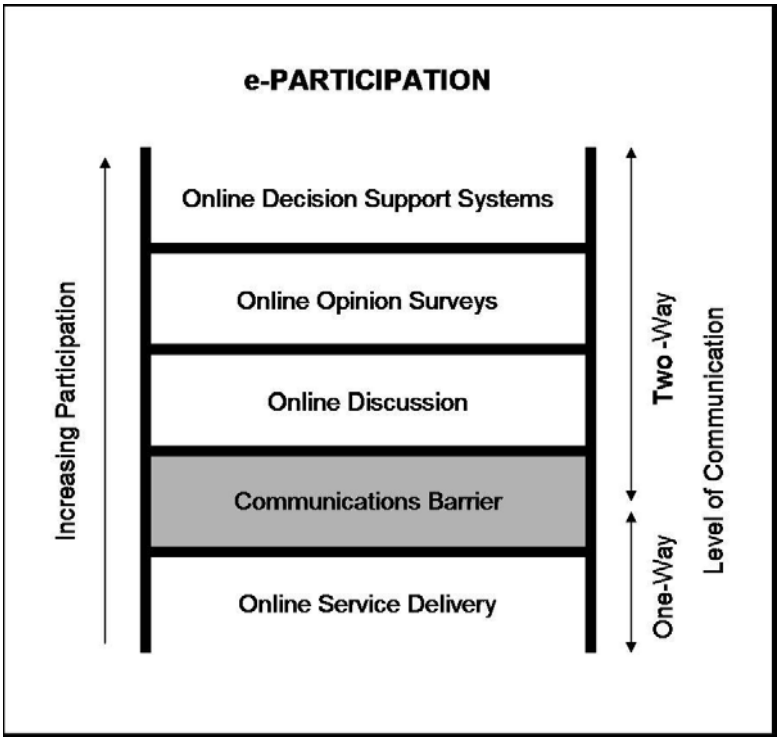


Figure 2.6 – The e-participation ladder
(After Smyth, 2001)

The e-participation ladder focuses on the degree of interactivity within public participation but addresses the increasing Web-based nature of public participation. The bottom rung of the ladder involves participation in an entirely passive mode with the online delivery of public services such as payment of rates and taxes, applications for licences and access to government information. Moving up the ladder, communication becomes bi-directional making participation more interactive through the sharing of information, ideas and feedback. At the top of the e-participation ladder full interactivity is present and participation is used effectively in the final decision. Carver (2003), states that the e-participation ladder breaks down barriers to participation, principally those concerning accessibility and socio-psychological factors.

Although numerous versions of the public participation ladder have been developed, there is evidence that a ladder hierarchy is unable to accommodate different forms of public participation, including new forms of participation. Schlossberg and Shuford (2005) state that simply mentioning that one wants public participation in his or her GIS effort can imply radically different interpretations of what that participation is supposed to achieve. Without clearly identifying and defining the orientation and objective of participation, there is ample room for confusion between the multiple actors who are governing, administering, or participating in a participatory process. Approaches that use the public participation ladder concept concentrate on types of participation, rather than the goals of participation or which participants are involved. The ladder concept is unable to address the unique and varied domains of “public” and “participation” that may exist for different projects.

Jackson (2001) presents a matrix model in which the objectives of participation are made primary, and are then combined with a broad categorization of the public. The integrated matrix presents a much better model for the PGIS community to build upon because it represents varied types of endeavours. In the matrix (Figure 2.7), the domains of the public are located along the horizontal axis

and the vertical axis is organized around specific domains of participation such as to inform, educate, consult, define issues, or build consensus. The goal of assembling a matrix such as this is to provide enough nuances in the domains to reflect real differences in the types of public and participation, while still maintaining a relatively clean conceptual framework (Schlossberg and Shuford, 2005).

Domain of Public

simple → complex

Domain of Participation: simple ↓ complex

	Decision Makers	Implementers	Affected Individuals	Interested Observers	Random Public
Inform					
Educate					
Consult					
Define Issues					
Joint Planning					
Consensus					
Partnership					
Citizen Control					

Figure 2.7 – Goal Oriented PGIS Matrix

Each cell of the matrix can contain certain attributes as a way to guide a PGIS project. Individual cells may have specific applications of PGIS, including the goals and objectives that such endeavours seek. When the cells are filled with such information, the user can then scan the types of public and participation that is desired and get a sense of what outcomes can be expected.

The field of PGIS covers a broad range of innovative tools which aim to support decisions for the majority of stakeholders of a decision problem. PGIS implements consensus building approaches which are aware of the spatial implications of a decision problem. Although challenges exist for PGIS

technology, especially regarding accessibility, ease of use and the integration of qualitative and quantitative information, a great deal of optimism also exists.

2.9.3 Spatial Technology in Affordable Housing Development

As discussed in the previous section, PGIS offers great potential to the future of public participation for a range of planning problems. One community planning problem that involves a significant amount of public participation is affordable housing development. Usually an extensive set of social and geographic issues exist for the development of affordable housing and there are often numerous community perspectives to consider. Spatial Technology such as PGIS tools discussed in the previous section offer the potential to provide methods for citizens to interactively visualize their community, learn about important factors to consider, discuss controversial issues in a controlled environment and build consensus regarding affordable housing projects.

After careful analysis of spatial information, citizens can become more knowledgeable regarding the many unknowns associated with locating affordable housing and can begin to overcome the negative connotations that are associated NIMBY attitudes. Hence, a useful approach using spatial information technology would be for long term analysis and planning of affordable housing. The procedure would involve first creating a spatial database of the housing and rental stock in the community, including locations of low income and subsidized housing. Other necessary information would comprise zoning information, parcel boundaries, city owned lands, the street network, public transportation, schools, hospitals, parks and trails.

Once the database has been formed, it can be assembled in a web-based collaborative GIS that is available to the public. The idea here would be for the public to become involved in the analysis of geographic relationships and to learn and debate the spatial implications of locating affordable

housing in their community. The system could also determine trends and help define problem areas in the community. Information gained through analysis could lead the residents to take a more informed, rational approach which may help influence where affordable housing resources might be allocated. More importantly, the general community would be able to acknowledge affordable housing as being a serious problem, resulting in momentum for creative solutions.

2.9.4 Problems and Future Directions of Spatial Technology

A number of obstacles exist with regard to the development of spatial information technologies in community planning. These problems have perhaps contributed to their relatively slow uptake in the planning field.

First, Internet access is still a major problem with web-based spatial information technology implementations. Al-Kodmany (2002) notes that while there is great excitement about future possibilities for Internet-based public participation, concerns generally centre on access to the technology. Access must be ensured in terms of making sure the pool of participants has Internet connectivity so that there will be wide representation in public participation. Carver et al. (2001) also affirm that the most important issue relates to Internet access. If the public does not have easy access to a Web-based PPGIS, the whole process becomes ineffectual. It cannot be assumed that everyone will have Internet access and a great deal of thought needs to be given to this fact. Although still a major barrier to Web-based spatial applications, most would argue that Internet access will continue to improve. Carver et al. (2001) indicate that current estimates of public Internet access vary from source to source, but it is becoming clear that over the next decade Internet access will continue to grow, eventually becoming as widely used as other consumer electronics. Access is also increasingly

being made available through open access points in public places such as libraries, community centres, council buildings, schools, universities, and businesses.

Another barrier to the use of Web-based spatial information technology is public understanding of computer technology. Carver et al. (2001) found that there was a lack of familiarity with the technology involved with computing in general and GIS in particular. In particular, many people had never used a mouse before, especially those from older age groups or employed in manual trades. In addition, certain individuals had difficulty understanding computer-based maps. It is expected, however, that these constraints will become less important as more and more people become familiar with computers and maps through work, leisure, or education. Mitcham (1997) also indicates that digital-map technology can be modified to suit the needs of a targeted end-user, and that inexperienced users are capable of adapting to new levels of sophistication in short time intervals.

One further problem regarding the development of spatial information technology in community planning involves data access and copyright problems. Although there have been decreasing costs of computer hardware and increasing availability of user-friendly software, high quality spatial data access continues to be a challenge. Progressively, data are becoming more accessible to non-government and community organizations, however certain barriers remain. For example, Carver et al. (2001) note that an important legal issue is copyright and that any system that is map-based could potentially be tied up in complex copyright and legal issues.

With considerable contributions to offer as well as a number of major barriers to overcome, the use of GIS-based technologies seems to have had and will continue, for the immediate future, to have limited success. In the late 1990's it was thought that significant future research issues should include better integration of decision models with map visualization components, a richer palette of techniques to express preferences and to prioritize choice alternatives, new techniques for fostering

consensus convergence, and the development of multi-criteria methods for selecting site locations for certain community planning problems (Jankowski, 1997). Even today, all of these challenges are still valid.

Regarding the problem of computer literacy and Internet access, Carver et al. (2001) state that digital television may play a vital role. It is predicted that over the next several years, digital television channels devoted to Internet-type access will provide a direct portal to on-line PPGIS systems, without the need for a computer and Internet connection. This effectively means that the majority of households will have access to Internet-type channels, some off which may be focused on participatory democracy.

Once issues such as computer literacy and Internet access are addressed, tools such as interactive Web-based GIS could become a critical and widely used medium to gain important feedback in community planning. Provided users are able to visualize updated spatial information effectively and openly communicate in an environment able to view input data of all participants, spatial information technology may take community participation several steps forward in the future.

2.10 Affordable Housing Solutions

Lorinc (2006) notes that overall, Ottawa spends approximately $2 billion a year to maintain its existing stock of subsidized housing. In addition, Canada needs to produce about 20,000 to 25,000 new units of affordable housing each year (equivalent to about $1.1 billion annually) just to get back to the levels of supply that were reached during the 1980s. Drummond et al. (2004) estimated what the poorest 20 percent of households should be paying for rent and then compared these figures with the average rents in large cities across Canada. For the country as a whole, the average shortfall is $2500 a year. The same authors also warn that job creation initiatives on their own will not buoy

income levels enough to make housing affordable for the working poor and social assistance recipients. Nor, in their view, is the existing system of income supplements (a combination of the child tax benefit, old-age security, social assistance, and federal or Quebec pension plans) anywhere close to being sufficient to close the $2500 affordability chasm.

Obviously the affordable housing problem is not easily resolved and Canada is likely to continue experience the grim symptoms of its affordable housing shortage. Due to the nature of city and town development in Canadian society, economic growth and development aims continually to improve and expand the built environment. Unfortunately, those without the economic resources to participate competitively in the housing marketplace are destined either to live under constrained circumstances or to find themselves in a downward spiral of housing quality.

Future solutions involving the development of affordable housing will be difficult to implement, especially as land use pressures increase in Canadian cities. Lorinc (2006) indicates that future solutions should involve more flexible income support programs, combined with funding and land-use policies that trigger the development of the types of housing that are desperately short in supply in Canada's large cities, such as affordable apartments, supportive housing (for the disabled, substance abusers, or the mentally ill), and subsidized housing.

J. David Hulchanski has stated that new spending must be divided with part of it going to offset construction costs (which typically make affordable housing developments uneconomic), and the balance dedicated to rental subsidies for low-income tenants (Drummond et al., 2004). Hulchanski maintains that this two-tier subsidy is able to create socially mixed communities. A construction subsidy will reduce the capital cost, bringing all rent levels down, and a rent geared-to-income subsidy helps very low-income and destitute/homeless people. One strategy meets the market demand for housing and the other meets social need for housing.

Solid planning principles are also mentioned in working towards affordable housing solutions in Canada. Lorinc (2006), for example, states that all three levels of government (Federal, Provincial and Local), not-for-profit housing organizations, and neighbourhood associations need to move beyond the NIMBY mindset to ensure that large cities and their suburban satellites embrace urban planning principles that encourage a far greater mix of housing than has been built in the past two decades. Not only does land use planning need to foster a mix of housing but the land use planning process needs to involve and empower those in need much more than in the past.

2.11 Chapter Summary

A number of important issues surrounding the concept of affordable housing in Canada were described in Chapter 2. Social trends such as wealth inequality, a growing elderly population, high levels of immigration, low marriage rates, and increased part-time employment were shown to worsen the affordable housing situation in Canada. Migration to cities and attractive communities was also discussed in the chapter. These areas have the most severe shortages of affordable housing within Canada and will continue to in the future. Certain segments of the population were identified as being deeply affected by housing affordability. These groups include single parents, recent immigrants, seniors living alone, and tourism/seasonal workers. Chapter 2 also discussed the role of key groups in the development of affordable housing, community housing design strategies and community engagement in particular as they apply to affordable housing in Canada.

In Chapter 2, Spatial Information Technology was introduced and discussed in the context of participatory planning. The implications of Internet technology and PGIS were detailed as new ways to improve participatory planning. The potential of this technology as it applies to affordable housing

development was also discussed. The following chapter will outline a study which implements Spatial Information Technology to address the problem of affordable housing in Collingwood, Ontario.

Chapter 3
Study Area and Methodology

The previous chapter introduced the topic of affordable housing and discussed the nature of the problem in Canada. A number of social and migration trends were reviewed, groups in greatest need and those involved with project development were examined, and community engagement and design strategies relating to affordable housing were discussed. In addition, the use of spatial information technology was considered in relation to land use planning and facilitating the development of new affordable housing projects.

This chapter describes a study which implements the use of this technology to address the problem of affordable housing in Collingwood, Ontario. The chapter first characterizes the town of Collingwood, describing its environment, economy, population, migration characteristics, and real estate and housing markets. A Web-based mapping tool called MapChat, utilized in the study, is then illustrated and its interface, map functions and chat functions are explained. The collection of spatial data and the participants involved in the study are described following the MapChat tool description. Finally, a three-phase MapChat research design is presented for Collingwood. The research design attempts to provide an effective methodology to locate suitable future affordable housing sites in Collingwood based on reliable spatial information and community participation.

3.1 Collingwood, Ontario

3.1.1 Environment and Economy

Collingwood, Ontario is located on the southern shore of Georgian Bay, approximately one hour's driving time, west of the city of Barrie. The Blue Mountains and Niagara Escarpment to the west and

Wasaga Beach to the east, which is the world's longest freshwater beach, are within close proximity (approximately 15 minutes driving time).

The Collingwood Economic Development Office (2005) notes that beginning in the mid-1800s, Collingwood was the railhead of Ontario and its harbour was the shipment point for goods destined to Western Canada. Shipping produced a need for ship repairs, which evolved into an organized ship building business, employing at its peak as much as 10% of the total labour force. By 1971, the creation of government incentive programs and a fully serviced industrial park allowed Collingwood to attract eleven new manufacturing firms and by 1983 eight additional manufacturing companies had located in the town.

Today, Collingwood still maintains a strong industrial base; however tourism has taken over as the most important industry. Due to the close proximity to the Greater Toronto Area (GTA) and a wide array of outdoor activities, the town has established itself as a four-season tourist area. Tourism drives businesses in Collingwood and economic benefits are seen from the large number of cottagers, skiers, sailors, golfers, fishermen, and other recreation seekers who visit. Tourism has also stimulated private sector investment which has lead to numerous new construction projects. The Collingwood Economic Development Office (2005) notes that private sector investment has expanded the marina potential by introducing timesharing condominiums and which have significantly expanded the vacation home component within the town.

Blue Mountain Ski Resort located just outside of Collingwood is another major developer in the area. In 1999 Intrawest, an international resort developer, purchased 50% ownership of the resort from the family of late Blue Mountain founder Jozo Weider. Together, Intrawest and the Weider family have accelerated development at the mountain in order to increase the number of resort visitors. In turn, this has created numerous new employment opportunities in the tourism industry.

Curto (2006) suggests that the Intrawest resort village development has been a catalyst for the current wave of development within the Collingwood region and that many residents feel that Intrawest has increased the desirability of the region for tourists, new residents, second home owners, and retirees. Some residents are also strongly against the rapid development in Collingwood and a broad range of views exist concerning Intrawest as a developer. Interviews in Collingwood conducted by Curto (2006) indicated that twice as many residents interviewed had favourable views compared to critical views. Figure 3.1 shows The Blue Mountain Resort Village, constructed by Intrawest at the base of Blue Mountain. The village is a major tourist attraction for its shops, restaurants, nightlife, and accommodation as well as a significant place of employment in the region.

Figure 3.1 – The Blue Mountain Resort Village

The labour market in Collingwood is unique. Powell and Ivanov (2005) indicate that the Collingwood unemployment rate for 2001 was low at 5% but that a large portion of jobs (40%) were in the service sector. As a result, the average earnings of Collingwood workers were well below ($10,700 less than) the provincial average. Curto (2006) mentions that the nature of the local labour market has actually lead to labour shortages in the region. The rapid rate of growth of the tourism/service sector in combination with generally low wages and high housing costs has facilitated this shortage. In addition, the lack of public transportation between employment locations such as the Blue Mountain Resort Village and surrounding communities, where the majority of its employees reside, is another contributing factor to labour shortages.

Interestingly, according to an Economic Impact Analysis study conducted by KMPG in the year 2000 on behalf of Intrawest, the Village at Blue Mountain will increase its number of visitors dramatically from approximately 650,000 annual visits to somewhere in the area of 2 million annual visits when the village is completed (Collingwood Vision 2020 Committee, 2000). This will yield a total of 3,595 (full-year equivalent) jobs. However, Intrawest has not made provisions for employee housing as part of their resort development plans, even though housing is provided to employees at other Intrawest resorts such as Whistler. This means that large numbers of low paid workers will be forced to find affordable housing in adjacent communities and commute to work at the resort.

3.1.2 Population and Migration

Despite the downturn in Canada's economy in the early 1990s, Collingwood has grown steadily over the past decade to a permanent population of 16,039 in 2001 (Town of Collingwood Economic Development Office, 2007). According to the present town of Collingwood Official Plan Update, projected population is estimated to be approximately 30,360 by the year 2021 (Collingwood Vision 2020 Committee, 2000). It is expected that the population increase will be the result of migration, in particular by the aging portion of the population who wish to retire in Collingwood (Powell and Ivanov, 2005).

Evidently, Collingwood has the unique ability to attract individuals despite the fact that it is considered a small town. As noted in Chapter 2, Simmons and Bourne (2003) have stated that there are very few urban places or associated rural areas outside of the metropolitan influence zones that are growing, with the exception of a limited number of recreation and retirement communities in amenity-rich environments. With low fertility levels and aging populations, communities can now grow only through attracting new residents from elsewhere. Many consider Collingwood to be an

attractive community and due to a wide range of amenities, proximity to the GTA and numerous recreation opportunities, it appears poised for continued population growth in the future. Individuals of all ages that are devoted to recreational opportunities away from the congestion of the city are drawn to life in Collingwood. Figure 3.2 shows a landscape view of Collingwood which accommodates water related activities to the north on Georgian Bay, and mountain related activities to the southwest in the Blue Mountains.

Figure 3.2 – The Collingwood Landscape

Collingwood's location lies within proximity of the urban region of Toronto and therefore is able to accommodate individuals that commute to Toronto to work. Many of these individuals manage to design a schedule which only requires them to be in the city for a day or two a week. Recent advances in technology have allowed commuters to live in Collingwood. Gertler (2001), for example, argues

that the information economy and the diffusion of new telecommunications technologies may have reduced the friction of distance and increased the importance of place and location. Simmons and Bourne (2003) contend that successful locations in the new economy increasingly will be places that are attractive to live in, because of their size, job mix, cultural diversity, or life styles. One commuting demographic that Collingwood seems particularly suitable for are those on the verge of retirement. The unique location of Collingwood gives these aging individuals the ability to cut back their hours significantly while continuing to work on a part-time basis in their later years. If needed, these individuals can easily commute to Toronto for meetings but in the meantime they can enjoy the lifestyle that Collingwood has to offer.

3.1.3 Real Estate and Housing

Due to Collingwood's attractive amenity, recreational opportunities, stimulated tourism-based economy, and significant population growth, the town of Collingwood has experienced a booming residential real estate sector. Low interest rates and high demand has lead to extremely high residential real estate prices for a town of its size. In an interview conducted by Curto (2006, 70), one resident spoke of residential construction in Collingwood as follows: "It's fast. The growth of large subdivisions is the most alarming part and I don't know who's buying them. I'm always talking with people I know in the community and asking them, 'who's buying all these places?', and it's no one I know or my friends know. Most people that are long-time residents of the area can't afford new homes that start at $279,000. It's got to be out-of-towners, people from Toronto that are retiring or buying second homes in the area. Because of the inflation in the housing market there is a serious lack of affordable housing." Curto (2006) adds that there is consensus that residents perceive rapid housing growth as largely driven by early retirement and those purchasing second homes that are planning on retiring in the area.

As expressed by the Collingwood Vision 2020 Committee (2000), the existing housing situation is rapidly in danger of spiralling out of control. Currently, the housing stock is unsuitable to meet affordable housing demands and the town as a whole does not yet appreciate the severity of the situation (Collingwood Vision 2020 Committee, 2000). Figure 3.3 shows residential construction, which is beyond the price range for those in need of affordable housing, at the base of the pier in Collingwood.

Figure 3.3 – Residential Construction in Collingwood

The type of growth and development that Collingwood is experiencing is typical of a resort community. Powell and Ivanov (2005) note that increases in housing costs have occurred in many resort communities including Aspen, Whistler, Banff, Montpelier, Lake Placid and Lake Tahoe. Although a prominent tourism industry and wealthy retirement population may have certain positive

impacts such as large amounts of capital to reinvest into the community, a number of negative trickle-down effects also exist. These include loss or deterioration of older housing stock, longer commutes for employees, employee shortages, and homelessness. Inflation of real estate prices often reaches such high levels that these towns become exclusive to those who can afford it.

The process of gentrification also contributes to rising real estate prices in resort towns such as Collingwood. Gentrification occurs when low-cost, often deteriorated neighbourhoods undergo renovation. In a short period of time the process can significantly increase property values and lead to extensive immigration of wealthier residents to the area. In Collingwood this takes form in the conversion of locally owned and rented homes to tourist rental units.

According to some residents of Collingwood this trend is seriously limiting the supply of rental housing. “People around here are buying older homes and places that are up for rent and they are fixing them up for the tourists so when the tourists come up here they rent them for a high price but people that don’t have that kind of income and are looking to rent on a monthly basis or a longer term basis, these properties aren’t available (Curto, 2006, 75).” This trend is also confirmed by Shelley Houston, a former employee of the Georgian Triangle Centre for Business and Economic Development (GTCBED). “Landlords are realizing that they can rent their townhouse out for the winter months for as much as they could get for a year, so they’re renting out seasonally, which means that there’s less available for people that are here year round”. This trend is significant because not only does it further deplete the existing housing stock but it also increases competition and subsequently increases prices for the remaining units on the market (Curto, 2006).

Figure 3.4 shows residential housing that has been converted into a Country Inn and Spa in the downtown area.

Figure 3.4 – Country Inn and Spa in the Downtown Area

The current affordable housing situation in Collingwood is severe. A local organization named the Georgian Triangle Housing Resource Centre was established in recent years to aid residents in their search for affordable housing. From January to December 2006, this centre registered 872 residents in need of affordable housing. The number seeking assistance is large relative to the town's size but this stems from a low vacancy rate and very few housing options.

Recent statistics show that Collingwood has less than a 2% rental housing vacancy rate and often times there are less than 10 apartments available (bachelor to three-bedroom) at any one time (Collingwood Vision 2020 Committee, 2000). Powel and Ivanov (2005) add that the waiting list for subsidized housing in Collingwood is 3-5 years. The disposition of the Collingwood housing market is a high demand, low supply, artificially inflated situation. To make matters even more frustrating for

low income residents, a large portion of houses in Collingwood may only have one occupant or sit vacant for many months of the year. Powell and Ivanov (2005) indicate that one-person households make up one third of all households in Collingwood.

Most of those employed in Collingwood who are renting, experience a large portion of their income going directly to rent. Linda Carriere, the former program manager of the Georgian Triangle Housing Resource Centre (GTHRC), commented on the inflated rental market as a result of the housing shortage, “We reckon most people, where they should be paying 30% (of income) for rent, most of our people (people using the housing service) are paying between 60% and 70% of their income for rent in this community (Curto, 2006, 73).” As noted in Section 2.2, affordable housing is considered to be no more than 30% of household income. Situations such as those described by Linda Carriere clearly illustrate a severe affordable housing problem in Collingwood.

The Georgian Triangle Housing Resource Center collected statistics on housing costs in Collingwood for 2005 and 2006. These statistics (see Table 3.1) show that a one-bedroom apartment in Collingwood was approximately $700 per month in both 2005 and 2006. Table 3.2 illustrates typical income sources in Collingwood with associated income averages and allowable affordable shelter cost (based on 30% of income). The statistics show that most income sources would not be able to afford a one-bedroom apartment in Collingwood based on 30% of their income geared toward housing.

As mentioned earlier in this chapter, approximately 40% of the jobs in Collingwood are in the service sector which means that the vast majority of this group would not have the income to support paying for a one-bedroom apartment. Also interesting to note in Table 3.1 is the cost of home ownership in Collingwood. In 2006, the monthly payment on an average home was $1,869. Clearly this is beyond the reach of most service workers in the community.

The cost of housing is also extremely prohibitive for anyone who is younger or is already disadvantaged such as single-parents, seniors or the disabled. These groups simply do not have the means to support paying for appropriate rental accommodation in Collingwood. Many individuals are forced to work at two or three jobs in order to make a living, and raising a family becomes nearly unmanageable. Inflated housing costs in Collingwood not only pressure those in need in the short term but also prevent migration from rent to ownership, lead to long commutes between home and work, and generally degrade the quality of life.

Unit Size	Average Rental Costs (2005)	Average Rental Costs (2006)
Room	$418	$447
Bachelor Apartment	$525	$550
1 Bedroom Apartment	$710 (36% do not include utilities	$703 (63% do not include utilities)
2 Bedroom Apartment	$795 + utilities	$875 + utilities
3 Bedroom Apartment	$895 + utilities	$1,000 + utilities
2 bedroom House/Condo	$927 + utilities	$925+ utilities
3 Bedroom House/Condo	$895 +utilities	$1082+ utilities
4 Bedroom House/Condo	$1179 + utilities	$1133 + utilities
Home Ownership		
Average price of homes sold	$223,000	$246,500
Income required	$62,440	$70,100
Monthly Payment	$1,700	$1,869

Table 3.1 – Housing Costs in Collingwood, Ontario
(From the Georgian Triangle Housing Resource Centre)

Source of income	Gross Monthly Income	Affordable Shelter Cost (based on 30% of income)
Senior (with base OAS & supplements)	Single $1,100	$330
	Couple $2,200	$660
Ontario Works recipient	Single $536	$161
	With 1 child $959	$364
Ontario Disability Support recipient	Single $957	$287
	With 1 child $1468	$547
Hospitality Industry Servers	$1,116	$350
Retail Clerk	$1,460	$438
Customer Service Staff	$1,791	$537
Assembly line Worker	$1,798	$539
Personal Support Worker	$2039	$611
Carpenter	$2,799	$840
School Teacher	$3,988	$1,196
Registered Nurse	$4,455	$1,336

Table 3.2 – Collingwood Income Averages
(From the Georgian Triangle Housing Resource Centre)

Compared with most towns and cities in Canada, Collingwood is much more expensive with regard to rental accommodation. According to Statistics Canada in 2003 (Table 3.3), the average annual expenditure on rent for all Canadians was $7,040 per annum. In Collingwood according to Table 3.1 the average rental cost of a one-bedroom apartment in 2006 was $700/month or $8400/year. Rather than being comparative to towns under 100,000 people at $5,620/year (as illustrated in Table 3.3), the rental costs in Collingwood are much closer to those that exist in Toronto or Vancouver, at $9,370 and 8,790 respectively.

	Rent	Mort-gage	Water, fuel, electricity	Property taxes	Annual shelter costs	Propor-tion of renters[1]
			$			%
Toronto	9,370	12,080	3,210	3,170	12,730	28.1
Calgary	7,820	10,190	2,680	1,880	11,640	24.3
Vancouver	8,790	12,180	1,970	2,230	11,520	33.3
Ottawa	F	9,460	2,510	3,060	10,950	F
Victoria	7,740	12,130	1,320	2,030	10,880	33.9
Edmonton	7,430	8,320	2,680	1,930	9,790	24.0
Canada	**7,040**	**8,680**	**2,330**	**2,190**	**9,390**	**28.1**
Saskatoon	5,950	7,210	2,620	2,450	9,280	26.3
Halifax	6,930	7,640	2,230	1,780	8,930	29.7
St. John's	5,280	7,700	2,580	1,470	8,540	20.9
Regina	5,470	5,960	2,520	2,310	8,470	23.9
Montréal	6,430	6,850	1,670	2,750	8,310	45.5
Saint John	5,410[E]	7,560	2,470	1,430	7,970	28.0[E]
Winnipeg	5,810	5,610	2,350	2,300	7,940	24.9
Québec	6,770	5,250	1,520	2,190	7,530	40.8
Towns (under 100,000)	5,620	7,110	2,220	1,700	7,750	19.2
Rural areas	5,260	6,820	2,370	1,360	6,870	4.7

Table 3.3 – Average annual expenditures on shelter components in select CMAs
(Source: Statistics Canada, Survey of Household Spending, 2004)

As noted earlier, the future industrial and tourism sectors in Collingwood are anticipated to expand significantly. The Collingwood Vision 2020 Committee (2000) suggests that Intrawest alone will create 3600 new full-time equivalent jobs at the destination resort. If current ratios continue to hold,

that means 60% of these employees (approximately 2000 people) will live in Collingwood. Therefore future demand for housing will be pushed even higher. The limited number of existing units would be pushed upward, making them less and less affordable for the majority of the town's residents. Housing figures indicate that Collingwood currently has 8,141 housing units. Based on anticipated population growth, at 2.5 persons per unit, an additional 3,700 units will be needed to accommodate growth to the year 2021 (Collingwood Vision 2020 Committee, 2000). Powell and Ivanov (2005) predict that there will be high demand for low wage employment in the future. Affordable housing will be needed in order to attract and retain these workers and if housing is not available, labour shortages will inevitably worsen.

Hence, Collingwood faces a very difficult challenge regarding the planning of future affordable housing. According to the Official Plan for the Town of Collingwood, one objective regarding residential land use designation is “To encourage housing forms and densities designed to be affordable to lower and moderate-income households”(Collingwood Town Council, 2004, 55). Although mentioned in the official plan, no clear plans have been set into action in terms of creating affordable housing. The most significant barrier appears to be that developers in the community have no incentive to build affordable housing.

The Collingwood Vision 2020 Committee (2000) notes that developers will always respond to market demand, therefore affordable housing requires intervention. Existing rental stock is not only depleted but also aging and both government and market conditions for the development of affordable housing simply do not exist. Figure 3.5 shows existing affordable housing units in Collingwood which are aging and in extremely limited supply.

Figure 3.5 – Existing Affordable Housing Units in Collingwood

The Collingwood Vision 2020 Committee (2000) proposed a number of recommendations to address housing needs including encouraging seniors housing, residential intensification through additions and/or conversions (granny-flats, accessory apartments, basements), creating a housing authority that manages the creation of resident housing and matches landlords with tenants, encouraging increased occupancy in and near the downtown core, creating transitional/seasonal worker housing using the concept of a lodge-type facility, actively lobbying large employers (such as Intrawest) to provide employee housing, and ensure that resident housing is inter-mixed into the normal marketplace, into a variety of residential zones. Although these recommendations are all valid, planning and implementation takes careful consideration and collaboration with the community, which of course takes time.

The Collingwood Vision 2020 Committee (2000) also recommended creating an Affordable Housing Task Force. Their mandate would be to inventory apartments in the downtown core, develop plans and ideas to encourage property owners to improve buildings in order to achieve stable occupancies, look at other opportunities for residential development in the core, review and make recommendations pertaining to property standards including enhancement/change to rear access/parking/appearance and inclusion of green spaces. This Task Force was created early in 2007, but at the time of writing the group was still organizing their specific goals and objectives. In the future, the Task Force appears to have the key community members involved and the political will to begin actively implementing solutions regarding affordable housing in the town.

3.2 The MapChat Tool

MapChat is an online geospatial tool designed at the University of Waterloo for participation in community planning. The tool allows users to navigate Web-based maps and supports participant interaction through commenting and annotation of maps. MapChat can also accommodate synchronous collaborative discussions between users for the purpose of building consensus and finding solutions for spatial decision problems. MapChat is an open source tool, meaning that the software is freely available to anyone without purchase costs or licensing fees. Users are also able to copy the source code in order to modify or improve the tool. The idea is to encourage the use of the tool in order to provide a means to solve planning problems. The core components required to install MapChat include: MapServer, PostGIS, PostgreSQL, MapScript, PHP and OpenSSL as well as a Web server such as Apache.

3.2.1 The MapChat Interface

After obtaining a username and password from a chat administrator, users may visit the log-on page for MapChat using a standard Web browser such as Internet Explorer, as shown in Figure 3.6.

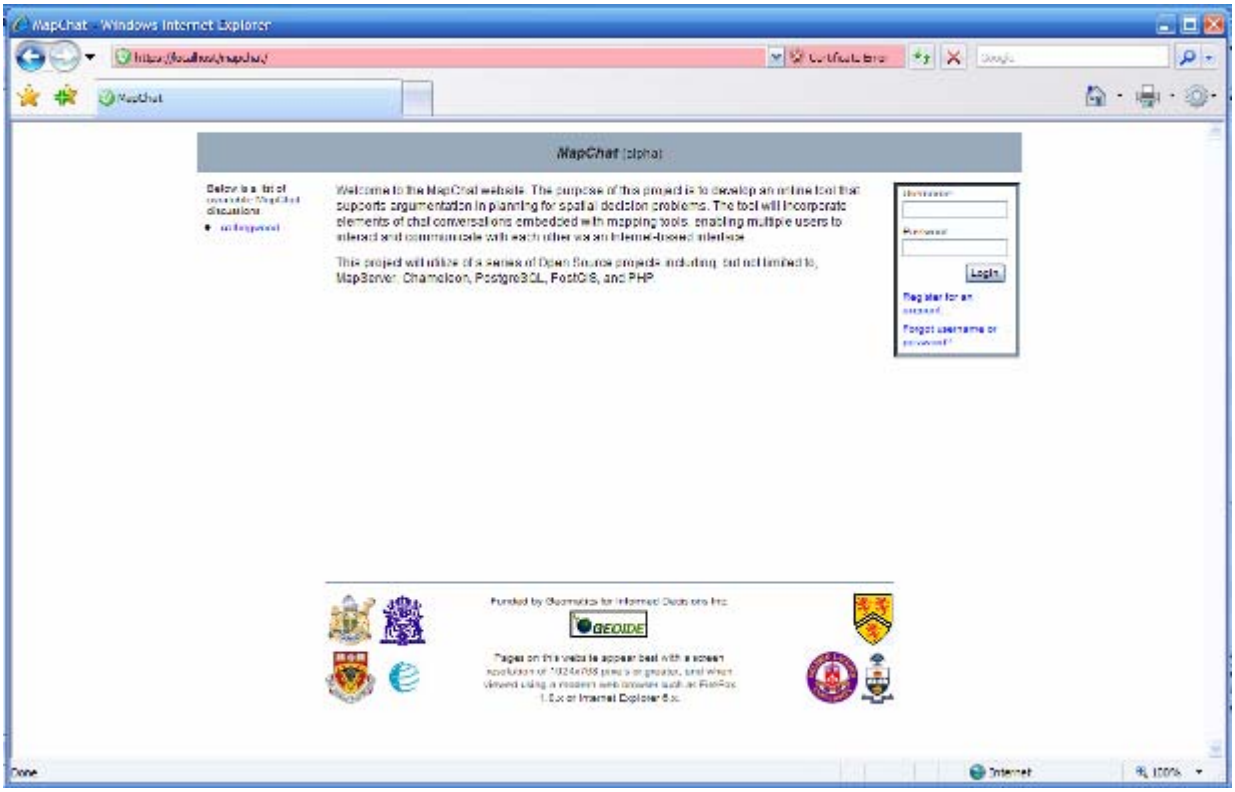


Figure 3.6 – Logging on to MapChat

Once the log-on page is shown, the user enters a username and password and joins a discussion listed on the left side of the screen by clicking on it. The MapChat interface is then loaded for that discussion (as shown in Figure 3.7). MapChat is able to accommodate many discussions, each with its own dataset and set of registered users. This way the system can organize a number of different planning problems separately for the same community and each contains all of the necessary spatial information, feature annotations and discussion associated with the problem.

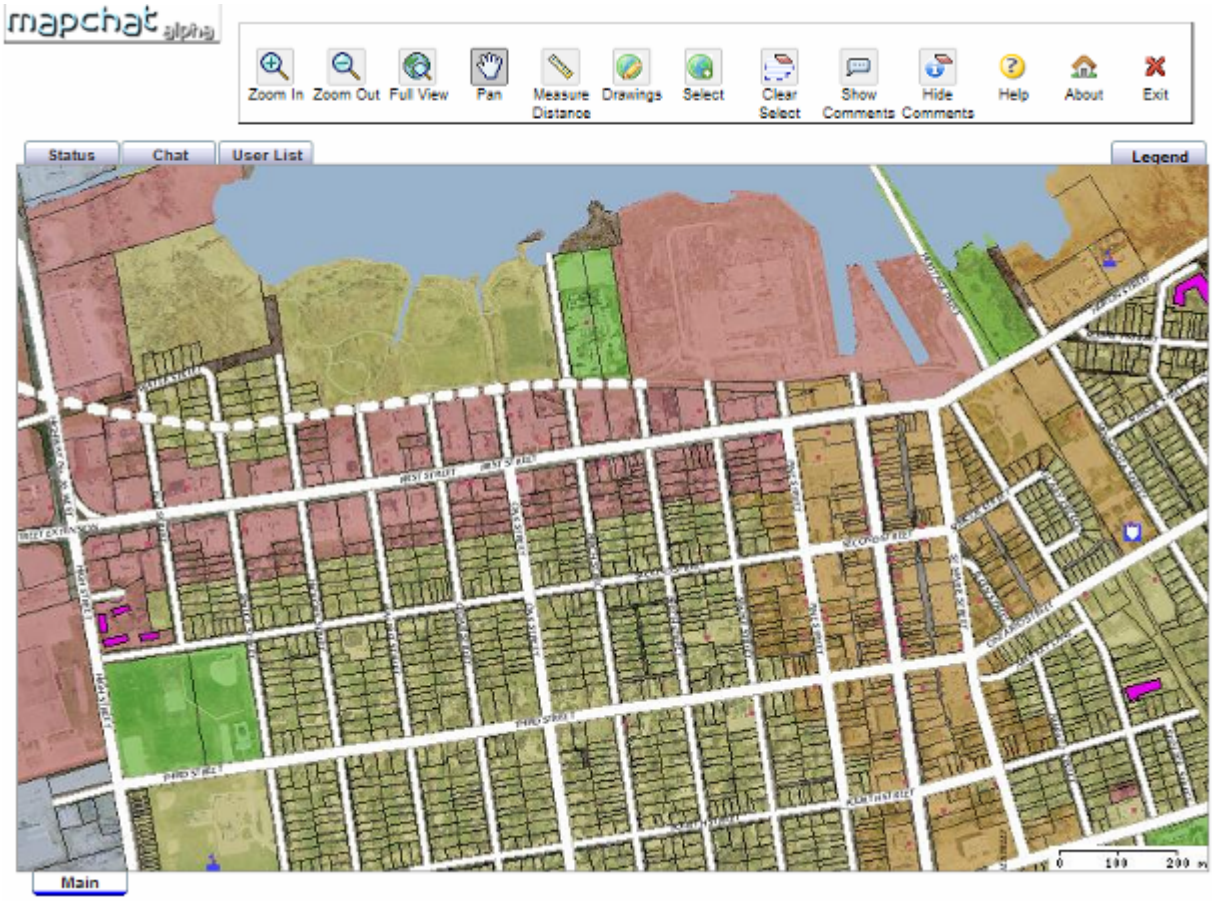


Figure 3.7 – The MapChat Interface - showing the town of Collingwood

The MapChat interface consists of several buttons across the top for navigation, selection and visualization. A map viewing area covers a large portion of the screen and allows the user to view spatial data, as well as associated comments and annotations. Four pull-down tabs allow access to: i) a map legend tab, ii) a summary of the status of the discussion, iii) a chat window which allows users to comment, annotate and have discussions with others, and iv) a user list that shows other active online participants.

3.2.2 Map Functions

One of the most critical objectives of MapChat is to provide an easy-to-use interface for inexperienced users to explore spatial datasets. The standard map navigation tools (Figure 3.8) include Zoom In, Zoom Out, Full View, Pan and Measure Distance.

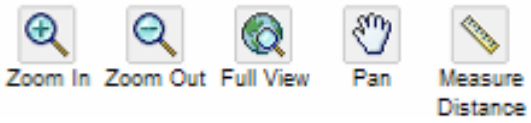


Figure 3.8 – Navigation Tools

Another important tool with respect to map functionality is the MapChat Legend, illustrated in Figure 3.9. The legend allows users to turn on and turn off certain map layers in the dataset in order to view layers clearly. When turning layers off and on, the user must click on the "**Update**" button at the bottom of the legend in order for changes to take effect.

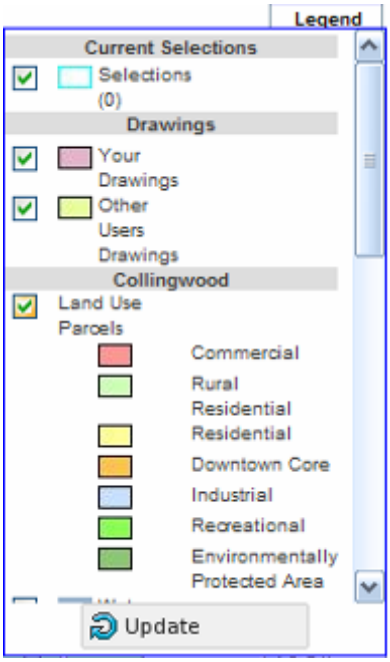


Figure 3.9 – The MapChat Legend

Perhaps the most powerful mapping function within MapChat is the ability to annotate map features. This allows users to enter their comments and opinions into maps, giving them much more meaning. There are two methods of annotating features in MapChat. The user may select existing map features and spatially link annotation or alternatively, the user may draw new map features and link annotation to those features.

The process for annotating map features using the selection method is shown in Figure 3.10. First, the user clicks on the '**Select'** button at the top of the MapChat interface. Second, the user selects which data layer they wish to select from. Third, in the MapChat viewer, the user selects one feature or multiple features (using the shift key) in the map. Once selected (and highlighted in blue), the last step is to type comments into the bottom of the Chat panel. After clicking '**Post**', the comment is then spatially linked with the selected feature.

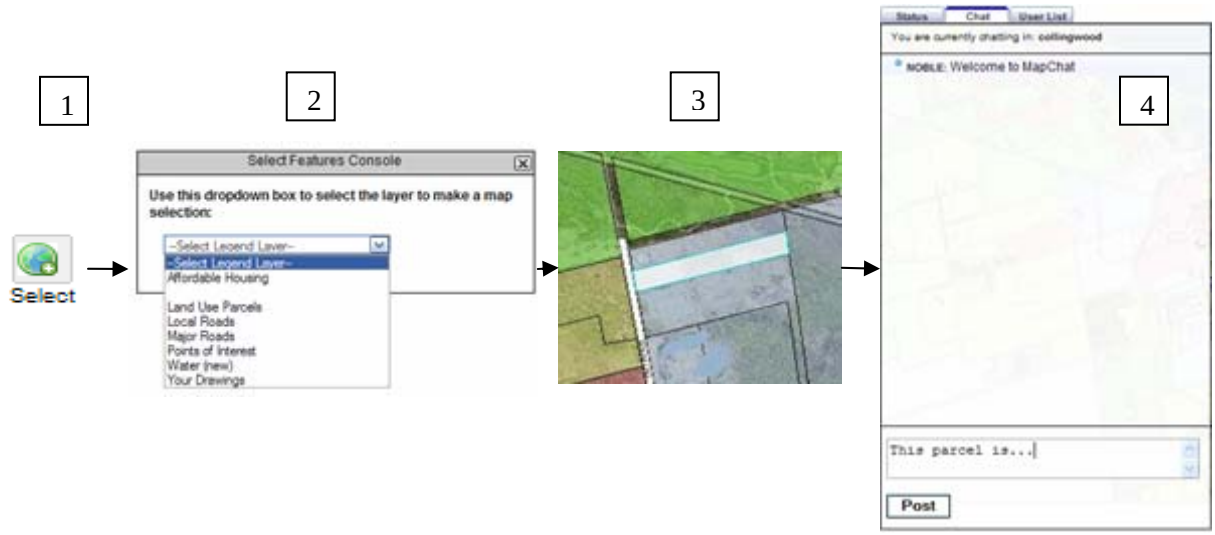


Figure 3.10 – Steps for Annotating a Selected Feature

The process for drawing a feature and linking a comment is similar to the process for a selected feature. As shown in Figure 3.11, first the user clicks on the '**Drawings**' button at the top of the interface.

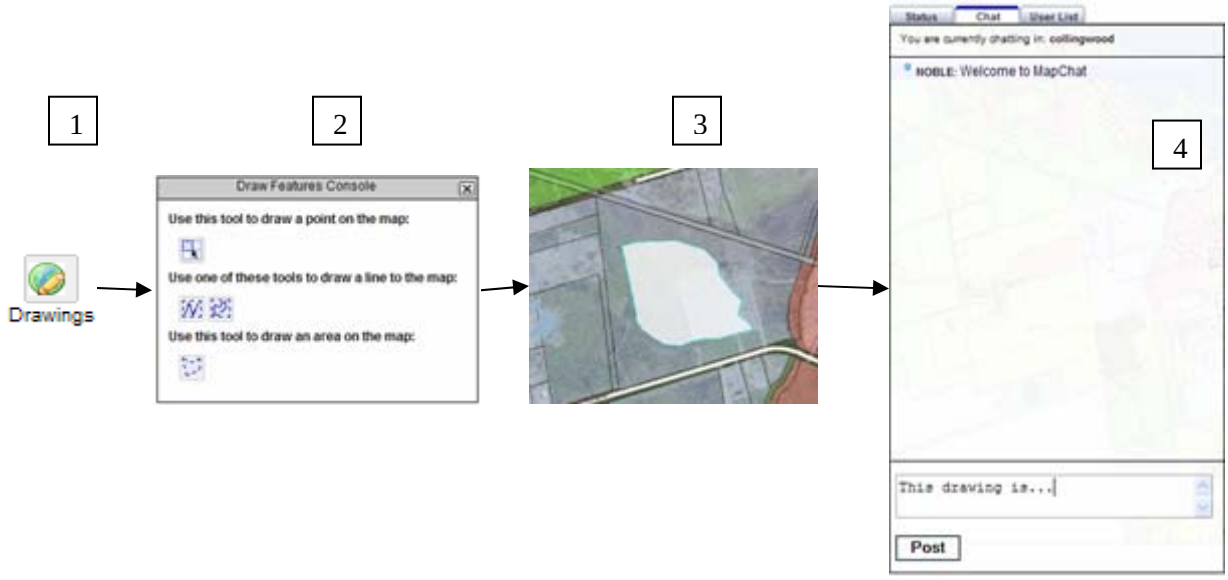


Figure 3.11 – Steps for Annotating a Drawn Feature

Second, the type of feature (point, line or polygon) is selected from the Draw Features Console. Third, the user creates that feature within the map view. Lastly the user enters a comment at the bottom of the Chat panel and clicks '**Post**'. The comment is then spatially linked with the user defined drawing.

3.2.3 Chat Functions

A number of Chat features exist in MapChat that facilitate discussion between participants. Users can annotate features as discussed previously, make general comments, or reply to comments made by other users through the MapChat Interface. All messages are threaded and each thread consists of action icons and the message itself. Within MapChat users are able to build structured discussions which are easily reviewed.

Once messages exist within the Chat panel (possibly from feature annotations) it is possible to reply to those messages that have been posted by other users. To do this a user must first access the

Chat window by clicking on the "**Chat**" tab within the MapChat interface. Second, the user selects a message to reply to by clicking on the blue dot directly beside it. After clicking on it the blue dot, it turns red, as shown in Figure 3.12. The third step is to enter the reply message in the bottom of the chat window. Lastly, the user will click "**Reply**". The reply message is posted into the Chat window and is automatically linked with the original message. In later review of the discussion the thread can be expanded and collapsed which makes managing the discussion very easy.

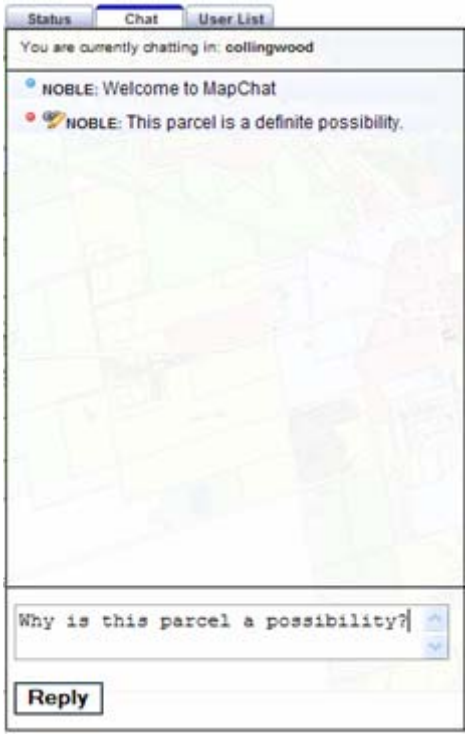


Figure 3.12 – Replying to a Message

Another useful Chat function is the ability to view comment-feature links. During discussion a user may wish to view the feature that a particular comment is associated with. In order to do this the user simply clicks on the pencil icon beside the comment. Immediately, that feature is zoomed to in the

map viewer and the comment is shown in a comment bubble. Figure 3.13 illustrates how comment-feature links can be shown in MapChat.

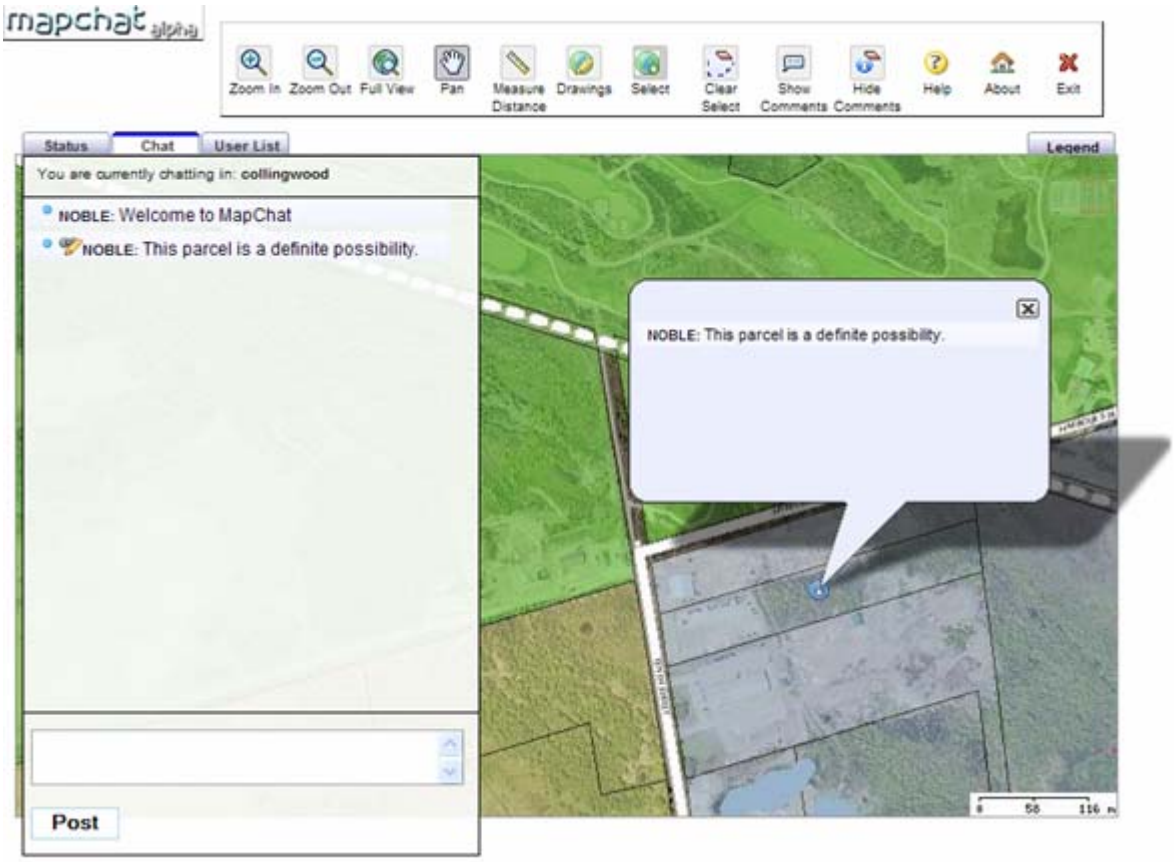


Figure 3.13 – Viewing Comment-Feature Links

3.3 Spatial Data Collection

The MapChat tool relies heavily on spatial data for visualization by users. As a result, it was essential to obtain a high quality spatial dataset for the use of MapChat to address the problem of affordable housing in the town of Collingwood. The collection of Collingwood data was facilitated by staff services from the University of Waterloo Map Library. The data is summarized in Table 3.1.

Data Layer	Source	Notes
Colour Air Photos	University of Waterloo Map Library	Collected in 2001, used as background layer
Property Assessment Parcels	Ministry of Natural Resources	Provided parcels for participants to select
Street Network	Town of Collingwood	Aided in finding locations
Water	Town of Collingwood	Background layer
Bus Route	Town of Collingwood	Important feature in the selection of affordable sites
Points of Interest	Town of Collingwood	Included supermarkets, schools, child care, hospitals, police stations and other amenities)
Land Use Layer	Town of Collingwood	Distinguishes different land use classes

Table 3.1 - Summary of Spatial Data Layers Used

Following data acquisition, all layers were copied onto the MapChat server and a MapServer map file was created which allowed the data to be translated into a viewable display mode within MapChat.

One data layer that was important for the Collingwood MapChat application was existing affordable housing units. Since this data layer did not exist, it was created for the purposes of the study. Existing affordable housing unit addresses obtained from the Georgian Triangle Housing Resource Center were digitized as a new layer using the street network and colour air photos as a guide. It was thought that this data layer would be useful for the application as it allowed users to see the distribution of existing affordable housing within the community.

Another layer that was needed in the Collingwood MapChat application was areas preferred by the city for building future affordable housing. Town development is influenced heavily by the Planning Department and more specifically by land use zoning regulations. It was thought that a "town preferred" layer would be useful in guiding participant selections while maintaining the general land use objectives of the town of Collingwood. Criteria from the Official Plan were used to create this layer. According to the plan, the following policies apply in relation to all new affordable housing developments (Collingwood Town Council, 2004, 56).

1) “It is anticipated that the majority of affordable housing units will be in the medium to higher density classifications such as apartments and town-housing. Innovative housing styles that facilitate affordable housing will be encouraged where consistent with the policies of this Official Plan.”
2) “While affordable housing may be situated throughout the municipality, particular consideration shall be given to its location in close proximity to shopping or community facilities and public transit.”

The layer used to represent these policy objectives was created using the following procedure. First, an existing density layer was queried to isolate medium and high density areas in the town. Next, a buffer operation was used to define all areas within 500 metres proximity to community facilities and public transit. The buffer distance of 500 metres was used as it was thought to be a reasonable maximum walking distance. Lastly the two layers were combined into one layer using an overlay operation. The resulting layer defined three classes including density, proximity and a third class in the overlap area between the two. This class satisfied both density and proximity requirements of the town. The purpose of the “town preferred” layer was to help guide participants in selecting appropriate future affordable housing sites in Collingwood. Figure 3.14 shows the town preferred data layer used in the study.

Figure 3.14 – Town Preferred Layer Used in the Collingwood Study

3.4 MapChat Participants

Forming a group of participants for the implementation of MapChat to address the affordable housing problem in Collingwood was a critical aspect of the study. Fortunately, a non-profit organization called the Simcoe County Alliance to End Homelessness (SCATEH) already existed in the community. This group has a vested interest in affordable housing issues and is active in bringing other community groups together to address the issues surrounding affordable housing.

Initial contact was made with Ms. Pam McDermott, the chair of the SCATEH. After internal discussions between group members, University of Waterloo representatives were invited to make a presentation at a SCATEH meeting. The purpose of the presentation was to demonstrate how the MapChat software could be applied to the affordable housing problem in Collingwood and to illustrate the potential benefits to SCATEH members. The presentation was successful and the group

decided unanimously that it was interested in partnering with the University of Waterloo to take part in the MapChat study for locating suitable sites for affordable housing in Collingwood.

Ten people participated in the study, mostly members of the SCATEH. Table 3.2 shows a list of anonymous individuals who attended the MapChat workshop.

User 1	Member of the Simcoe County Alliance to End Homelessness
User 2	Chair of the Affordable Housing Task Force, Member of the Simcoe County Alliance to End Homelessness
User 3	Collingwood Resident
User 4	Member of the Simcoe County Alliance to End Homelessness
User 5	Member of the Simcoe County Alliance to End Homelessness
User 6	Chair of the Simcoe County Alliance to End Homelessness
User 7	Member of the Simcoe County Alliance to End Homelessness
User 8	Simcoe County Data Analyst
User 9	Simcoe County District School Board Planner
User 10	Georgian Triangle Housing Resource Center, Member of the Simcoe County Alliance to End Homelessness

Table 3.2 –List of Anonymous Collingwood MapChat Participants

3.5 MapChat Research Design

A research design was constructed to address the objectives of this thesis. To reiterate, these objectives are:

1) To define a collaborative, spatially-aware approach to create and assess affordable housing options in Collingwood, Ontario;

2) To implement the designed approach in a real-world setting by running a hands-on collaborative assessment exercise with recruited participants; and

3) To examine the spatial patterns of existing affordable housing and the locations identified in the study to determine sites that are most suitable for future affordable housing development in Collingwood.

The research design therefore needed to be suitable for real-world implementation, present spatial information to participants in a meaningful way, facilitate interaction between participant and computer and between participants, and be capable of collecting a sufficient quantity of useful community-based information. It was hoped that the research design would also provide an effective approach that yields useful information for the town of Collingwood to locate future affordable housing sites. The following section describes the design for assessing affordable housing options using the MapChat collaboration tool.

The study was designed to have three phases. The first phase was a conventional workshop (same time, same place) in which participants learned to use the MapChat tool and began making individual map annotations related to locating future affordable housing. The second phase of the study was an online distributed meeting (different time, different places) where participants continued to do their individual annotations in order to build up a collection of possible sites chosen by participants. The third and final phase of the study was a same time, different places online meeting where participants visualized and discussed all individual selections. Figure 3.15 shows the three phase research design of the study.

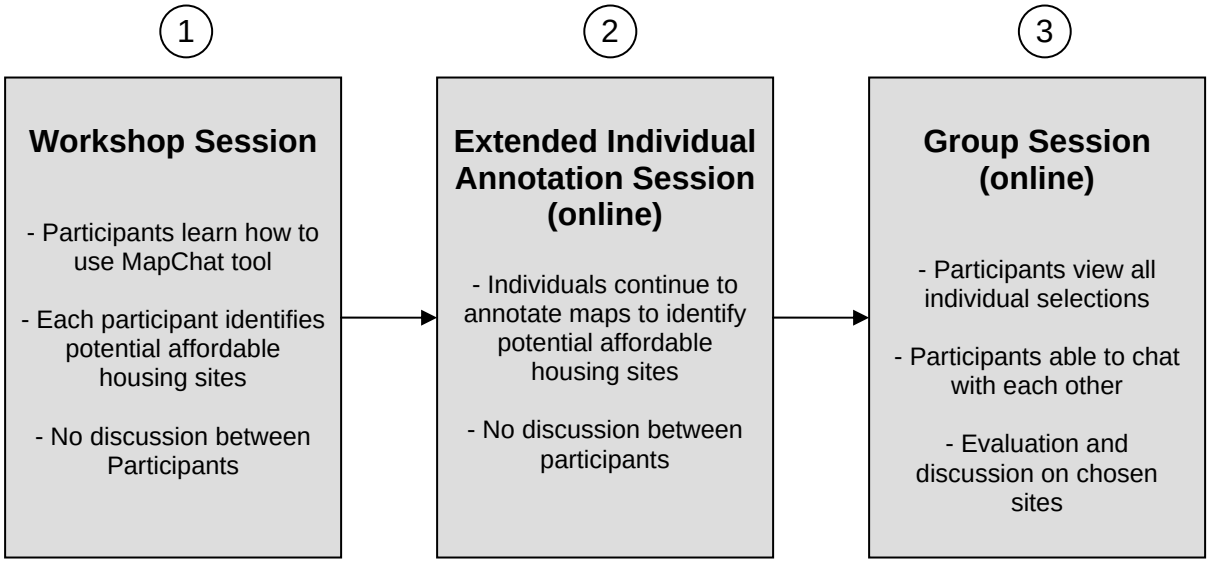


Figure 3.15 – MapChat Research Design

3.5.1 Phase 1 - Workshop

The first phase of the implementation was conducted on April 30th, 2007 from noon until 4pm at the Collingwood campus of Georgian College. The workshop took place in one of the computer labs at the college which accommodated approximately twelve desktop computers with access to the Internet. Ten participants arrived at the college in order to take part in the MapChat workshop.

The workshop began with a presentation to participants introducing the problem of affordable housing in Collingwood, and stating the goal of the workshop which was to select and discuss suitable locations for future affordable housing using spatial information technology. After the introduction, approximately one hour was spent giving instructions on the use of the MapChat tool. Instructions were given on how to logon to MapChat, navigate within the MapChat interface, and to select and annotate spatial features within MapChat.

After participants spent some time learning to use MapChat, instructions were given to complete individual annotation work. This work involved participants interacting with the Collingwood dataset

and selecting favourable areas for future affordable housing development in the Town. Individual annotations took up the majority of the time of the workshop, lasting approximately 2 hours. Appendix A outlines the protocol used in the workshop to guide participants in selecting sites.

During the workshop participants were also prepared for phase 2 and 3 of the study. This included making sure that participants were comfortable making additional individual annotations on their own as well as chat instructions for the group session. Participants were given handout materials with instructions to aid in the completion of tasks in phase 2 and 3 of the study (see Appendix E). Handouts as well as all other aspect of the study were given full ethics clearance from the University of Waterloo. Appendix F shows notification of full ethics approval.

3.5.2 Phase 2 - Online Individual Annotations

Although study participants learned how to use the MapChat tool in the workshop and made affordable housing site selections, there was insufficient time to complete all selections. The Online Individual Annotation Session was an online continuation of the workshop which lasted three days (May 1st – May 3rd) following the workshop. The Online Individual Annotation Session required users to log on to MapChat using their own Internet resources and select and annotate areas or parcels that were potential locations or areas of interest for affordable housing in Collingwood.

3.5.3 Phase 3 - Group Session

The third and final phase of the Implementation was an online meeting in which participants logged on to MapChat at the same time from their home or office computers. Study participants were instructed to log on to MapChat (https://gaia.uwaterloo.ca/mapchat/) on Sunday May 6th and Monday May 7th , 2007 from 7pm-9pm. To prepare for the online group meeting, all individual annotations

were combined into one discussion within the MapChat interface. This allowed participants to view the input from all other participants including selections, drawings and comments. The Group session also allowed participants live interaction with each other using the chat functionality within the software. The goal of the Group Session was to use all participant annotations to stimulate discussion and debate regarding individually selected locations of potential future affordable housing sites within the town of Collingwood.

3.6 Evaluation of the MapChat Tool

Pre- and post-use assessment of a tool like MapChat is an integral aspect of software development. Typically, pre-use assessment is done in-house or through limited engagement with alpha and beta testing groups. Post-use assessment occurs when a tool has passed the alpha and beta stages of development. Due to the fact that MapChat was an alpha release during the study, only pre-use assessment was used for evaluation. This involved developer observation of participants as they interacted with the tool and listening to participant comments throughout the study. Following alpha and beta testing, the MapChat tool requires a rigorous approach to evaluate its effectiveness.

3.7 Proposed Analysis Methods

Data collected from the study are analysed in Chapter 4. First, the characteristics of participation are analysed, then spatial entities created by participants are examined and finally the comments entered by participants are analysed. The participation characteristics of the study are analysed by graphing the level and type of participation of each study phase over time. This allows participation to be visualized for each phase of the research design, for each participant. The spatial entities created by participants are analyzed by determining the pattern of participant-selected clusters. If participants favoured certain areas, selections are visualized as clusters for the remainder of the analysis. If

dispersed, the selections are evaluated as individual entities. Analysis then focuses on proximity and overlay operations involving criteria from a number of diverse points of view, including the practical needs of low-income families, the interests of town planners, and the requirements of the community in general. Analysis of comments collected during the study involves an examination of the content of messages contributed by and exchanged between participants in the study. Comment analysis first maps which participant selections had associated comments. Subsequent to mapping, an evaluation is performed which subjectively categorizes comments into high, medium and low regarding their relevancy and level of detail.

3.8 Summary

Chapter 3 has described the study area of Collingwood, the MapChat geospatial tool, spatial data collection, participants involved, and the MapChat research design used in the study. The chapter characterized the severity of the affordable housing situation in Collingwood and noted that the problem will perhaps worsen in the future. The MapChat geospatial tool and its functionality were introduced as it is intended to be applied to the affordable housing problem in Collingwood. Spatial data and study participants were also discussed as they were required to implement MapChat effectively in Collingwood.

The research design of the study is an approach which implements MapChat in Collingwood for the purpose of locating future affordable housing sites using community participation. This research design needs to be suitable for real-world implementation, present spatial information to participants in a meaningful way, facilitate interaction between participant and computer and between participants, and be capable of collecting a sufficient quantity of useful community-based information. The research design involved three phases including a MapChat workshop in

Collingwood, an online individual session for continued map annotations and an online group session to view and discuss all of the individually selected sites. The MapChat Implementation yielded interesting results which are analysed and discussed in the following chapter.

Chapter 4
Analysis and Results

The previous chapter identified the methods by which the MapChat tool can be implemented in a small tourist town to locate affordable housing based on citizen participation. The research design involved three phases. The first phase was a meeting which brought participants together, introduced the use of the MapChat tool, and initiated the annotation of web-based maps in order to locate potential future affordable housing sites in the town. The second phase was an online session which allowed participants to continue locating potential affordable housing sites in isolation of the researcher or other participants. The third and final phase of the research design was an online group session which showed all individual annotations and facilitated real-time online discussion between participants using the Internet as the means of contact. This chapter analyses data collected during these three phases of the research design and discusses the results.

Data collected from the MapChat implementation are analysed in three ways. First, the nature of the participation observed in the study is presented and discussed. Second, a spatial analysis of the sites chosen by participants is conducted. This consists of feature calculations, the creation of potential affordable housing clusters, and proximity analysis which determines the most suitable locations within potential affordable housing clusters. The final component of the analysis includes a qualitative analysis of the comment data collected in the study. This analysis evaluates individual input and communication between the participants.

4.1 Participation Analysis

Participation is a centrally important aspect of the research in this thesis. As discussed in Chapter 2, successful participation in the planning process allows for priority problems to be identified, relevant options to be formulated, and effective solutions to be implemented. Without open participation, the planning process would cease to be democratic and a gap would exist between those in power and the rest of the community.

This thesis argues that new and innovative approaches are needed to increase public participation in affordable housing development in order to reach people that are sometimes excluded from the process. Also, the thesis seeks to generate new types of information from the public as input into the development process. Traditional approaches sometimes do not facilitate sufficient interaction or provide significant information to public officials in order to influence their actions. As a result, members of the public may become unsatisfied or feel disconnected using traditional planning methods.

This thesis has identified a new approach for community participation in planning which utilizes Internet technology and a participatory computer-based tool, namely MapChat, to address the problem of locating affordable housing. The topic of affordable housing development usually involves a wide range of resident viewpoints as well as numerous development constraints within the community. Thus, informed community participation should include participation in learning the planning problem and participation in expressing individual comments or viewpoints. The following sections discuss participatory learning and as well as participatory contributions made in the study.

4.1.1 Participatory Learning

Time spent by participants learning about the identified planning problem is crucial especially in affordable housing development. In the Collingwood MapChat study, the initial workshop session provided an opportunity for participants to learn more spatially about the affordable housing problem in Collingwood. Although most participants were members of the SCATEH and were knowledgeable about affordable housing issues in the community, it was clear that individuals were interested in learning more about the problem. All participants listened carefully to the initial presentation, and throughout the workshop asked numerous questions regarding the use of the MapChat tool, and about Web-GIS in general.

Following an introductory tutorial, the participants explored the Collingwood spatial dataset. Clearly, this was a relatively new form of information to participants. However, their excitement and enthusiasm indicated that they were interested learning about the spatial relationships associated with affordable housing in the community. Numerous questions arose concerning the content of the dataset, including the origins of the 'Town Favoured Lands' layer and how it should guide their selections. Several participants discussed this verbally in the computer lab, which again illustrated that participants were actively involved in the workshop and willing to learn more about the problem.

4.1.2 Participatory Contributions

Participation in terms of contributions or comments entered by participants into the MapChat database can also be evaluated. This type of participation is much easier to quantify because MapChat stores all participant input into the system. After the initial learning phase, participants were asked to interactively select potential affordable housing sites and to annotate these sites with comments

explaining the reasons for their selection. Appendix A outlines the protocol used to guide participants in making their selections.

Figure 4.1 illustrates the annotation frequency of participants during the MapChat workshop.

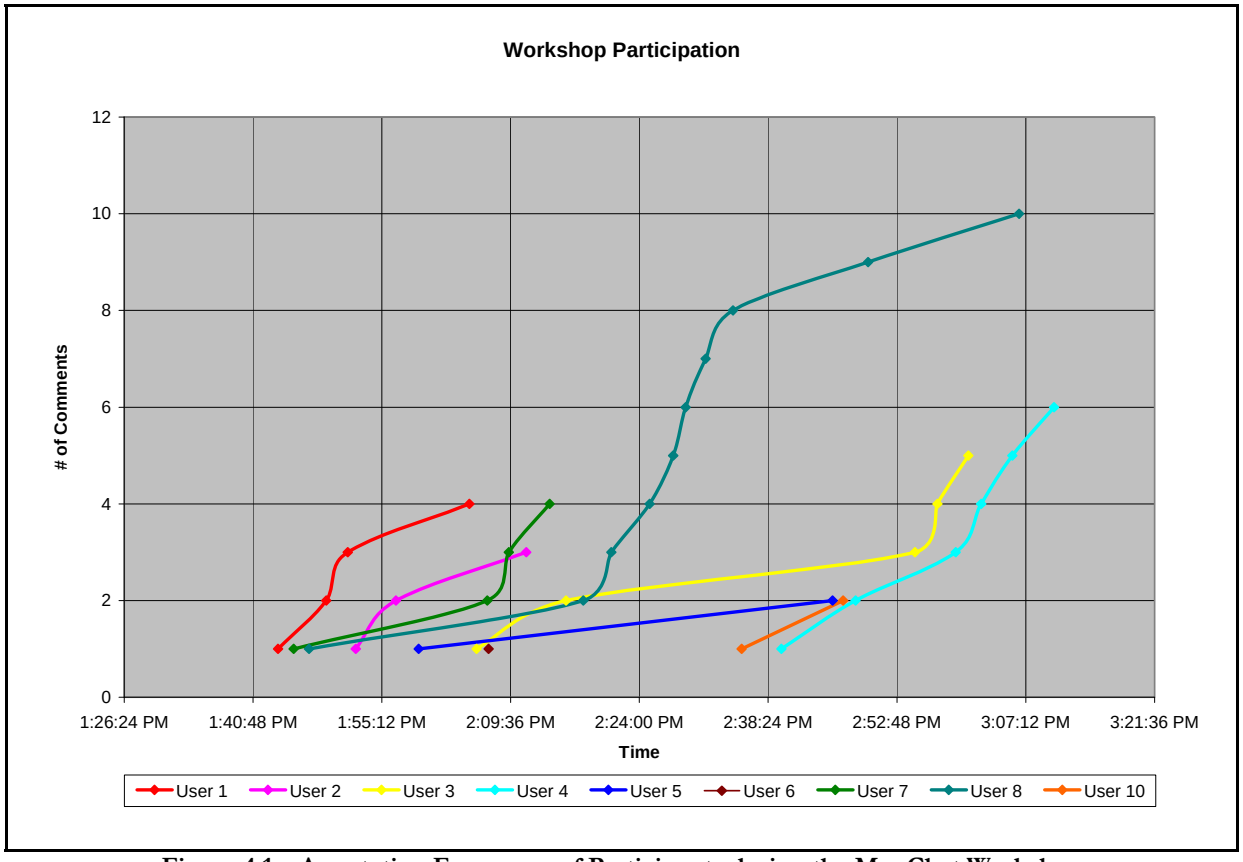


Figure 4.1 – Annotation Frequency of Participants during the MapChat Workshop

The results show that annotation was highly variable between participants. The highest number of annotations made by one participant was 10 while the lowest was 0 (User 9 - not shown). The average number of map annotations made per participant was 3.7. The frequency of annotation can also be interpreted from the graph by evaluating the steepness of the lines. Gradual lines for users 5, 7 and 8 could indicate that these users were not comfortable with the use of the MapChat tool, were unclear concerning the instructions, or were thinking of relevant contributions to make. It is also interesting to

note that participant annotations generally became more frequent over time, perhaps indicating a higher level of comfort using the MapChat tool.

The second phase of the study was an individual online session over the three days that followed the initial workshop session. The goal of this phase was to have participants continue selecting and annotating locations which were thought to be potential sites for future affordable housing development. As illustrated in Figure 4.2, the participation observed during the individual online session was significantly reduced in comparison to the initial workshop session. Although the session was identified as being required, only two participants joined and the total number of annotations was eight. On the first day of the session, User 10 made three annotations, and on the last day, User 3 added five annotations.

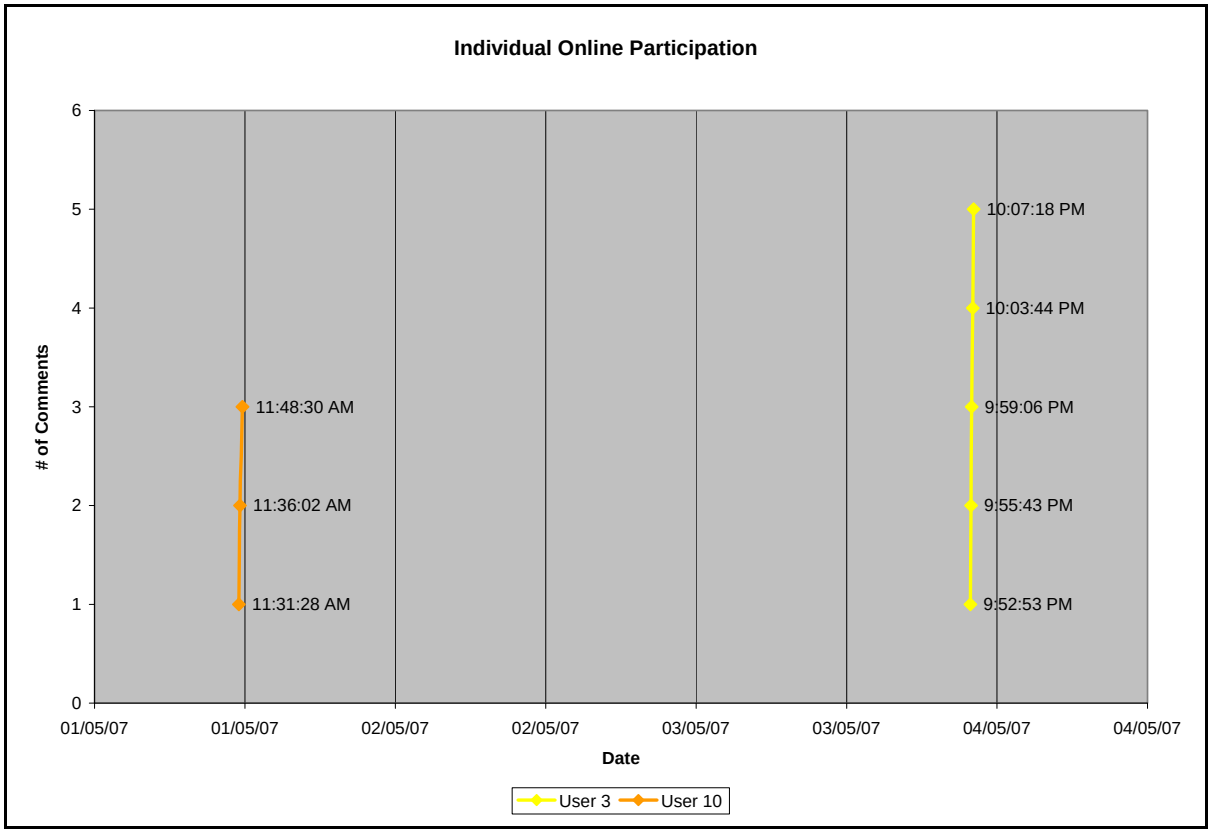


Figure 4.2 – Participation during the MapChat Individual Online Session

The third and final phase of the study was a two hour online group session which integrated all individual results from earlier phases of the study. The objective of this session was to communicate all individually selected sites and annotations to the entire group and initiate online discussion between participants. The results of the online group session in Figure 4.3 show that four participants and two facilitators took part.

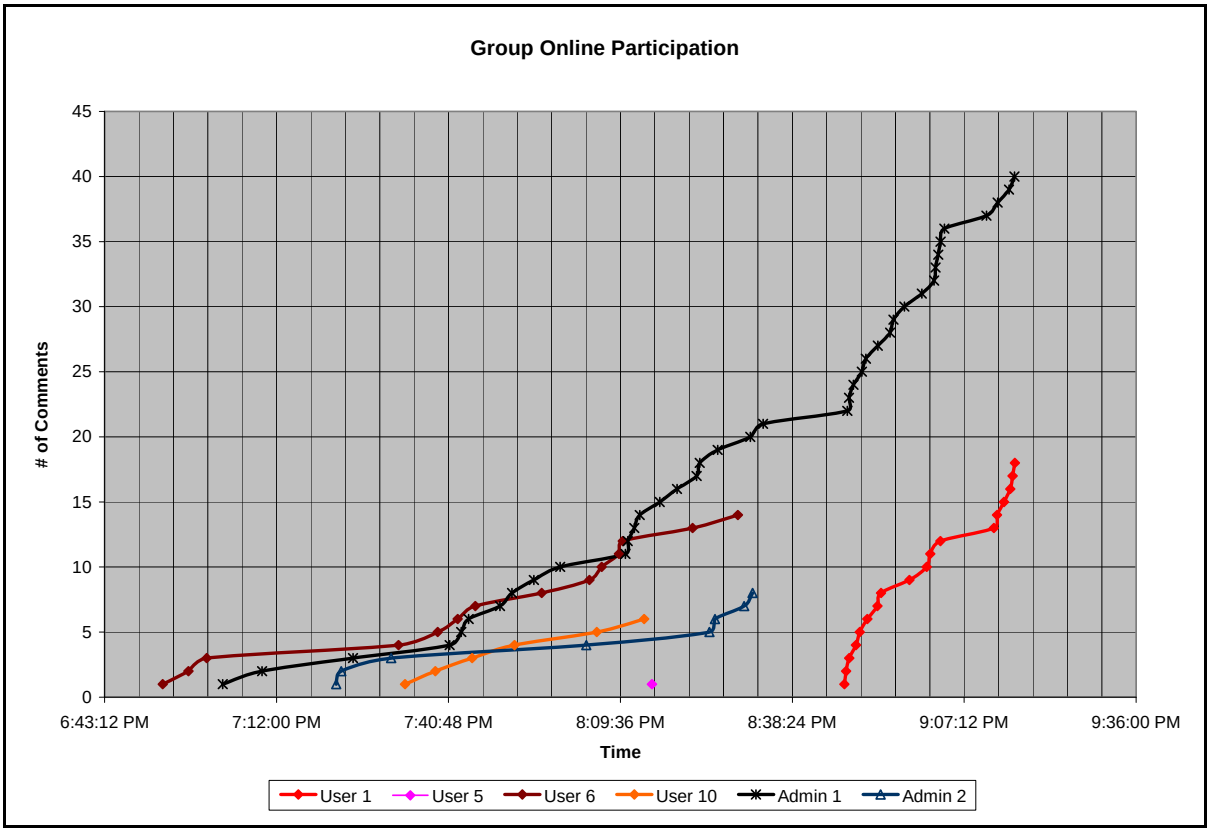


Figure 4.3 - Participation during the MapChat Group Online Session

The initial participation was quite staggered, perhaps demonstrating each participant's preference for a convenient time to participate in the group session. Unfortunately, this had a limiting effect on the possibility of discussion between participants. Figure 4.3 reveals that the only possibility of discussion between participants was between User 6 and User 10 for approximately 30 minutes during the period in which User 10 was active. It is also possible that User 5 may have participated in discussion but only one comment was submitted. Discussion between administrators and participants did occur in the online group session and the content of this chat is examined more closely in the Comment Analysis section.

The extent of participation during the group online session included a total of 39 comments from 4 participants. These included 18 comments from User 1, 1 comment from User 5, 14 comments from User 6, and 6 comments from User 10. In addition there were 40 comments submitted by Facilitator 1 and 8 comments from Facilitator 2. Although these comments were not considered participation, they were an important part of the discussion as they stimulated interaction from participants.

4.2 Spatial Analysis

Tangibly, the most valuable product derived from the study was a set of participant-selected sites for future affordable housing locations. The set of site locations represented input from all participants that had taken part in the study. In order to characterize and better understand relationships associated with the sites, several steps were taken to prepare, measure, and conceptualize the sites prior to analysis. To do this, the original set of sites was prepared by removing certain features that were the result of user error. Next, potential (and existing) site features were measured to calculate area and density. After feature calculations were made, the overall distribution of sites was measured using global statistics. The sites were then amalgamated and mapped as clusters so that they could be more easily conceptualized as twelve distinct zones preferred by the participants. Finally, the clusters were analysed with a set of community criteria to determine optimal locations within participant-favoured clusters.

4.2.1 Data Preparation

Prior to conducting spatial analysis, the set of potential sites was adjusted to include only valid selections. A portion of the collected data was evidently the result of user error with the drawing tool in MapChat. As a result, slivers and visibly out-of-place drawings were removed. Large drawings (over 1 sq km) were removed as they were considered too large to represent potential locations. Some

drawings with irrelevant comments (i.e. “there should be a university here”) were also removed. Finally, repetitive drawings by the same user were deleted. Although several drawings were removed during data preparation, care was taken to maintain the integrity of the original data, meaning only features that were clearly not applicable were removed.

Figure 4.4 shows both the original as well as the adjusted site locations. The latter was used as the basis for all further analysis involving participant-selected sites in the study.

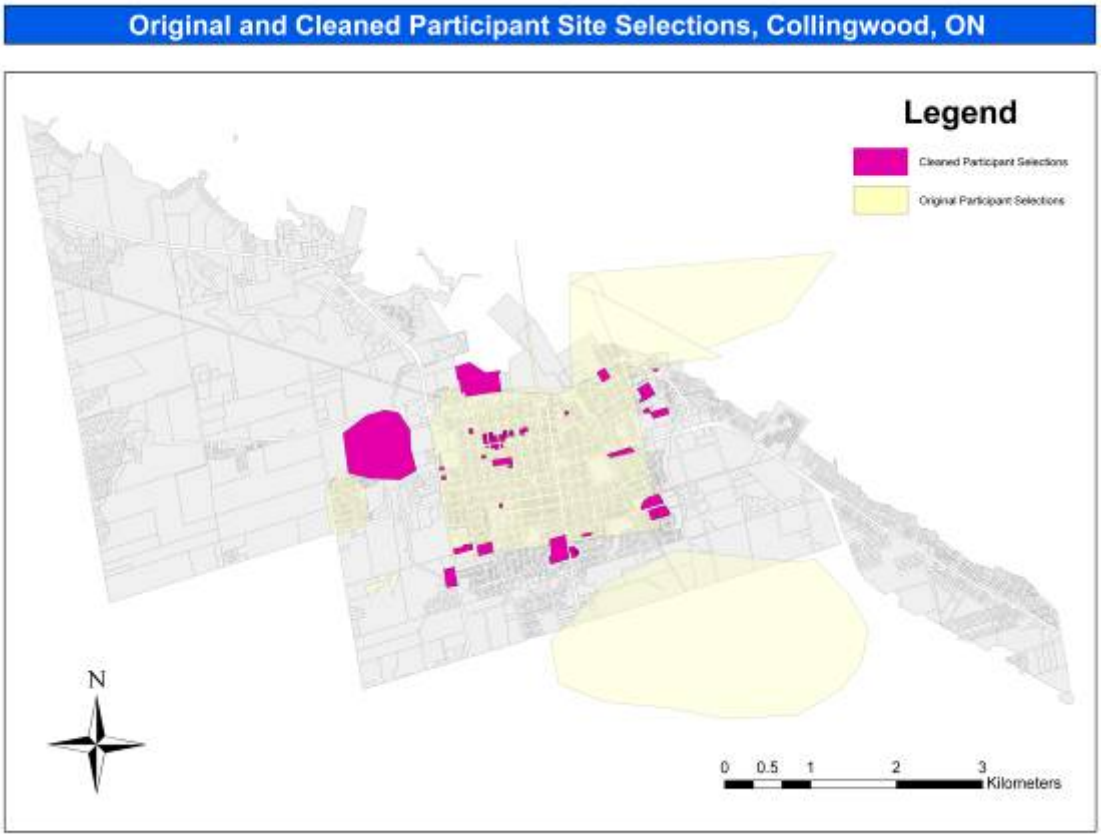


Figure 4.4 – Map Showing Cleaned Participant Site Selections

4.2.2 Feature Calculations

In this section, summary statistics are reported for existing affordable housing and participant-selected sites for future affordable housing. The polygon features associated with existing affordable housing are examined first to determine the total area of existing affordable housing land use, average affordable housing lot size, percentage of Collingwood land used for affordable housing, and the density of affordable housing units per acre in the town. Following this, calculations for the proposed affordable housing sites are reported including the area of each selected site, the total area of all selected sites and the average size of selected sites.

The results in Table 4.2 conclude that the total land area of the eight existing affordable housing sites is 13.45 acres, with an average lot size of 1.68 acres.

Address	Area (Sq. M)	Area (Acres)
1 High Street	1989.74	0.49
2 Murray Court	9913.55	2.45
312-320 Seventh Street	8023.85	1.98
233 St. Paul Street	3683.03	0.91
25 Napier Street	6406.57	1.58
150 Albert Street	2208.93	0.55
250 Erie Street	4804.24	1.19
101 Matthew Way	17410.12	4.30
Total Area	54440.02	13.45

Table 4.1 – Area Calculations for Existing Affordable Housing

In addition to average lot size, the percentage of land that existing affordable housing occupies was calculated by dividing the total land area of affordable housing into the total area of land for Collingwood (7681.44 acres). The percentage of land that affordable housing occupies presently in Collingwood is 0.175%.

The area of each participant's selection was calculated using ArcGIS and is shown in Appendix B. The results of the calculation indicate that the total area of all participant selections was 294.5 acres of land. If this total is divided into the total number of sites selected (93), the average site size for participant selections was 3.17 acres. The size of sites selected by participants will be discussed and compared to existing site size in Section 4.4 - Discussion of Results.

4.2.3 Distribution

The success of affordable housing development is influenced by spatial distribution. For example, neighbourhoods of high poverty concentration have been associated with high levels of unemployment, high school dropouts, teenage pregnancies, increased crime and drug use and

decreased motivation to change one's circumstances (Kazemipur, 2000). While these factors are often seen as a cause or result of poverty alone, some studies show that residing in neighbourhoods of concentrated poverty amplifies these problems (Kohen et. al., 1998; Soubihi et. al., 2001; Dunn, 2002). As it relates to poverty, spatial distribution is therefore a significant issue regarding affordable housing development. Ford (2003) indicates that the dispersion of affordable housing throughout a city is one means of deconcentrating poverty.

This section measures the overall clustering or dispersion of existing and proposed affordable housing sites using the average nearest neighbour global statistic. This statistic was appropriate because it gives a straightforward snapshot of overall distribution. In addition, the average nearest neighbour global statistic does not take attribute values of the data into account. This was suitable as existing and proposed affordable housing sites were lacking meaningful attributes. All sites were converted into points from polygons because point features allow the entire distribution of points to be measured rather than the individual features. Chou (1996) indicates that there are three basic types of point patterns including clustered, scattered and random. Clustered point features are concentrated in one or a few relatively small areas and form groups. Scattered point features are characterized by a regularly spaced distribution with a relatively large inter-point distance. Random point features are neither clustered nor scattered in their pattern.

Using the “Features to Points” operation in ArcGIS, the existing affordable housing sites and proposed participant selected sites were converted to points. This created two new point layers which could undergo distribution analysis. For visualization purposes, Figure 4.5 illustrates the number of units available at each existing affordable housing location. The map was created using the “Count Rendering” operation in ArcGIS, which applies graduated circle rendering to a count type field of a point feature class.

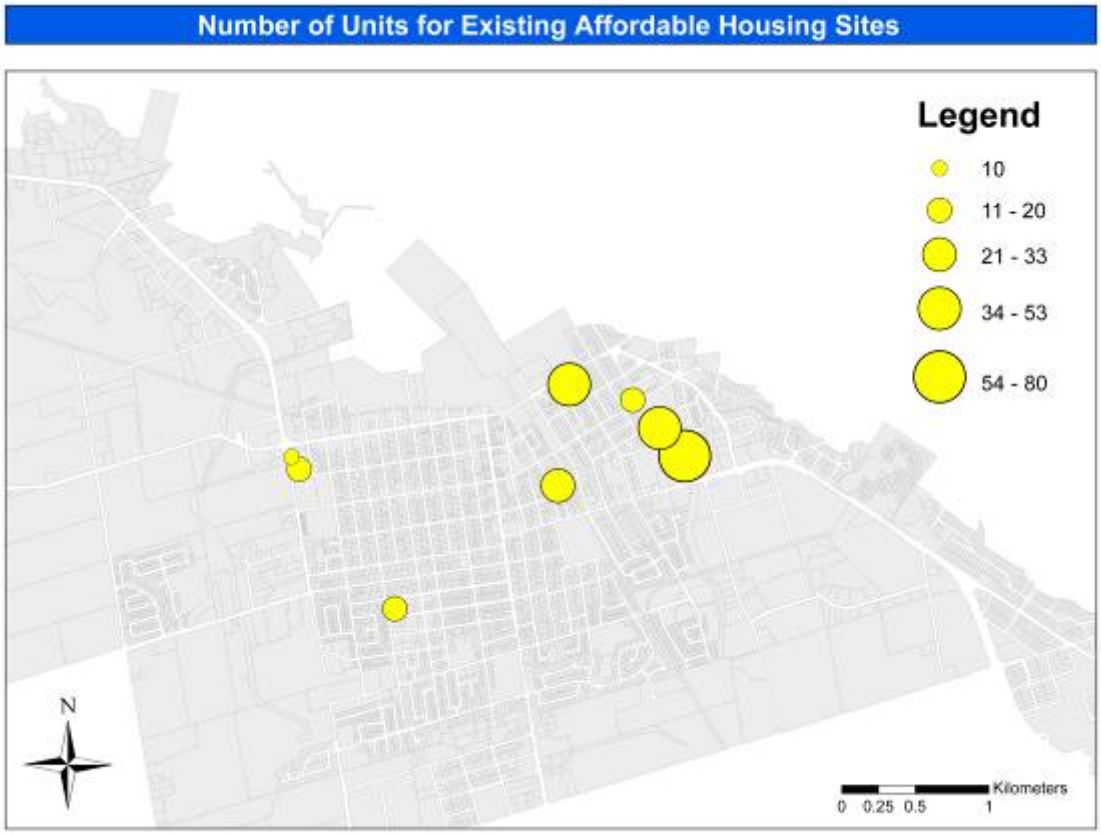


Figure 4.5 – Map Showing Number of Units at Each Existing Affordable Housing Location

The average nearest neighbour global statistic produces a single numerical value that describes one aspect of the spatial properties of an entire dataset. Chou (1996) explains that the nearest neighbour index measures the degree of spatial dispersion in a distribution based on a minimum inter-feature distance. The rationale is that the average distance between points in a clustered pattern is shorter than in a scattered pattern. In addition, a random pattern is associated with an average inter-space distance that is larger than a clustered pattern and smaller than a scattered pattern.

Using the average nearest neighbour global statistic, the degree of clustering/dispersion was calculated for existing affordable housing sites. The results in Table 4.3 show a nearest neighbour

index of 1.34, indicating a somewhat dispersed distribution. Typically, if the index is less than 1, the pattern exhibits clustering, while if the index is greater than 1, the trend is toward dispersion. The Z score indicates statistical significance or the odds that the observed pattern is the result of chance. In this case, the Z score of 1.86 suggests that there is a small likelihood (5-10%) that the dispersed pattern is the result of random chance.

The same average nearest neighbour procedure was applied to the point layer for proposed sites, selected by study participants. As shown in Table 4.4, the results show that the distribution of proposed sites produces a clustered distribution because the index is less than 1. The Z score of 10.65 indicates statistical significance or a less than 1% likelihood that the pattern was the result of random chance. In utilizing the nearest neighbour global statistic, two important points can be noted concerning the point distribution of existing and proposed affordable housing. First, the current distribution of affordable housing within the town of Collingwood is generally dispersed, which is beneficial to the community. As indicated by Kazemipur (2000) in Section 1.2.3, neighbourhoods of high poverty concentration have been associated with several social problems. These problems may be reduced or avoided with a dispersed distribution of affordable housing in Collingwood. Second, in terms of the proposed housing distribution, the pattern is clustered. Interestingly, this indicates that participants consistently selected certain zones or clusters within the town. As a result of this pattern of selection, it was logical to conduct further analysis and visualize participant selections as larger clusters, rather than as individual features. Analysis using participant selected clusters allowed selections to be conceptualized in a simplified manner, while still maintaining the integrity of the data. The following section describes how participant selected affordable housing sites were amalgamated into clusters prior to analysis.

4.2.4 Cluster Mapping

The previous section determined that the proposed affordable housing site distribution was clustered. This suggests that study participants consistently selected specific zones as preferred locations. For the purposes of visualizing relationships and to proceed with proximity analysis, participant selections were mapped into cluster areas using GIS techniques.

To create clusters, participant selected polygons were buffered to a distance of 100 metres, using a dissolve operation simultaneously. The distance of 100 metres was used because it was an optimal distance to amalgamate sites within proximity without enlarging the clusters too much. A new layer was created of several clustered participant selected areas. This layer was then converted using multipart to singlepart within ArcGIS, which gave each cluster feature its own unique identifier and associated properties. Finally a spatial join was used to append the attributes of the original participant selected polygons to each cluster. The procedure used to create participant selected clusters is shown in Figure 4.6 and the resulting cluster map is displayed in Figure 4.7.

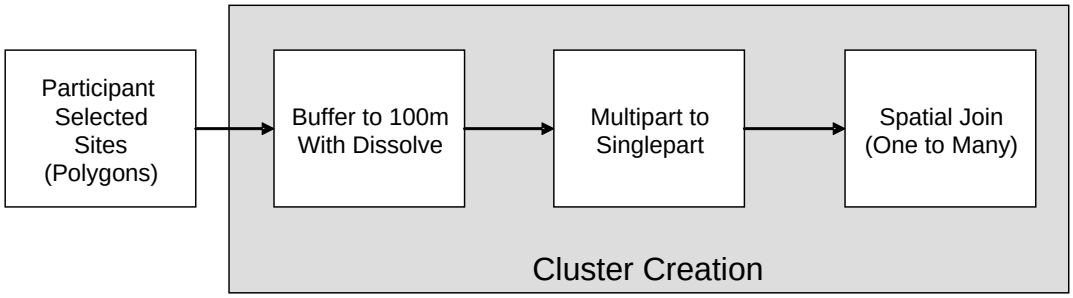


Figure 4.6 – Procedure for Creating Participant Selected Clusters

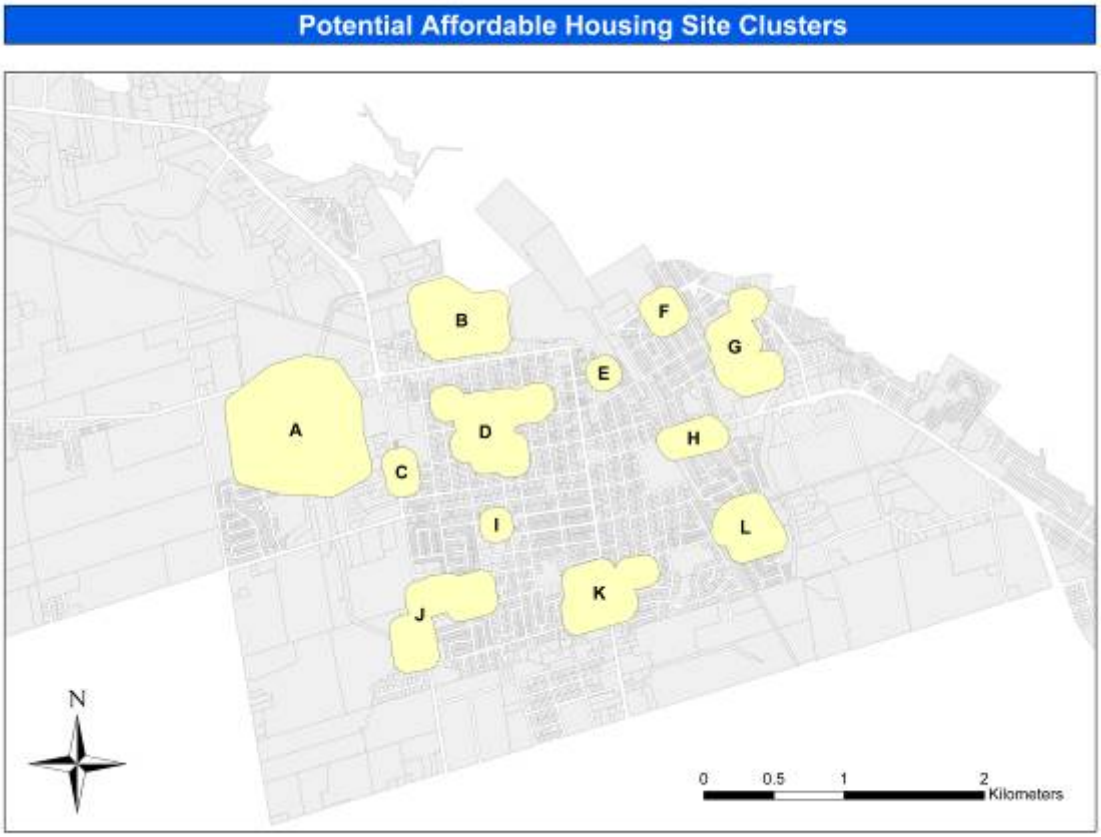


Figure 4.7 – Map Showing Participant Selected Clusters for Future Affordable Housing

The cluster map shows that there are twelve distinct clusters (labelled A-L) that are favoured by participants in the study. Generally, the distribution of clusters is central and located in the most built-up area within the town limits. The number of participant selections within each cluster range from one to forty-five. Figure 4.8 displays the frequency of selections for each cluster.

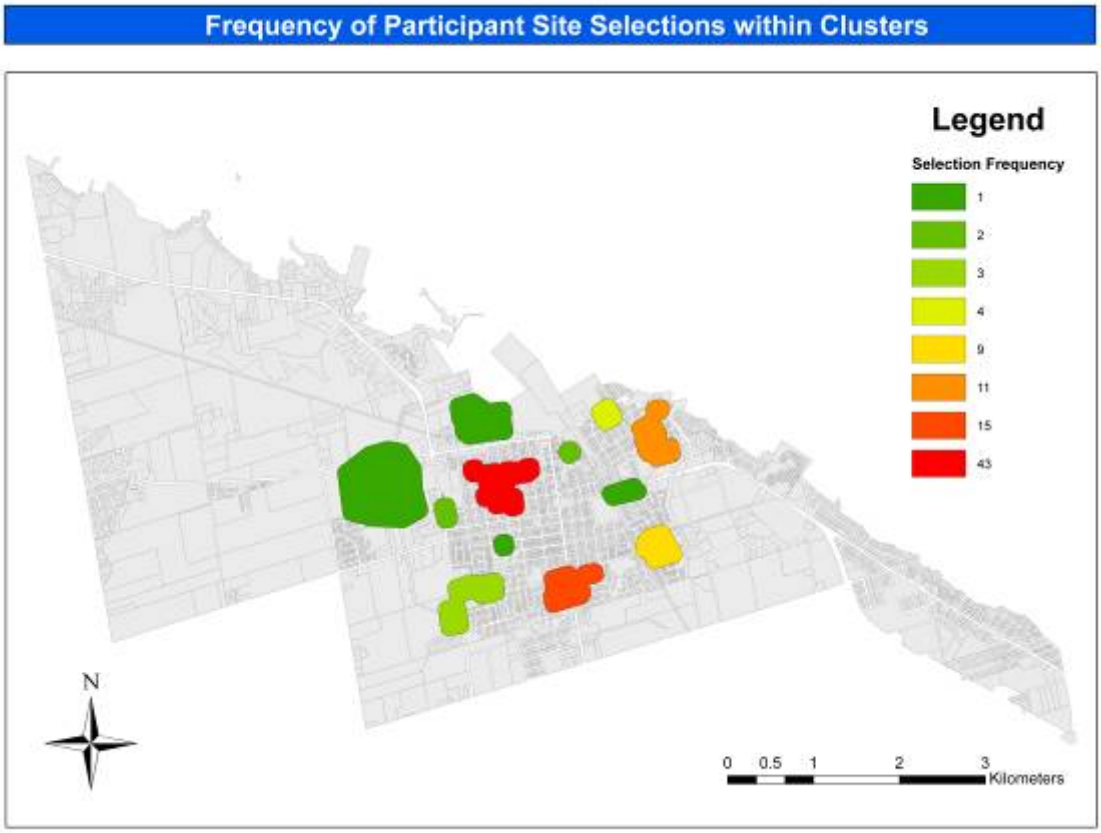


Figure 4.8 – Map Showing Frequency of Affordable Housing Site Selections within Clusters

Several of the clusters have very few participant selections, while one site (Cluster D) has 43 selections associated with it.

It is interesting to note the relationship between participant-selected clusters and other community features. For example, Figure 4.9 shows the relationship between proposed clusters and existing affordable housing locations. Clusters I, F and G all contain existing affordable housing and Cluster G in fact contains 3 of the 8 existing affordable housing locations. Proximity of clusters to existing housing is examined more closely in the following section.

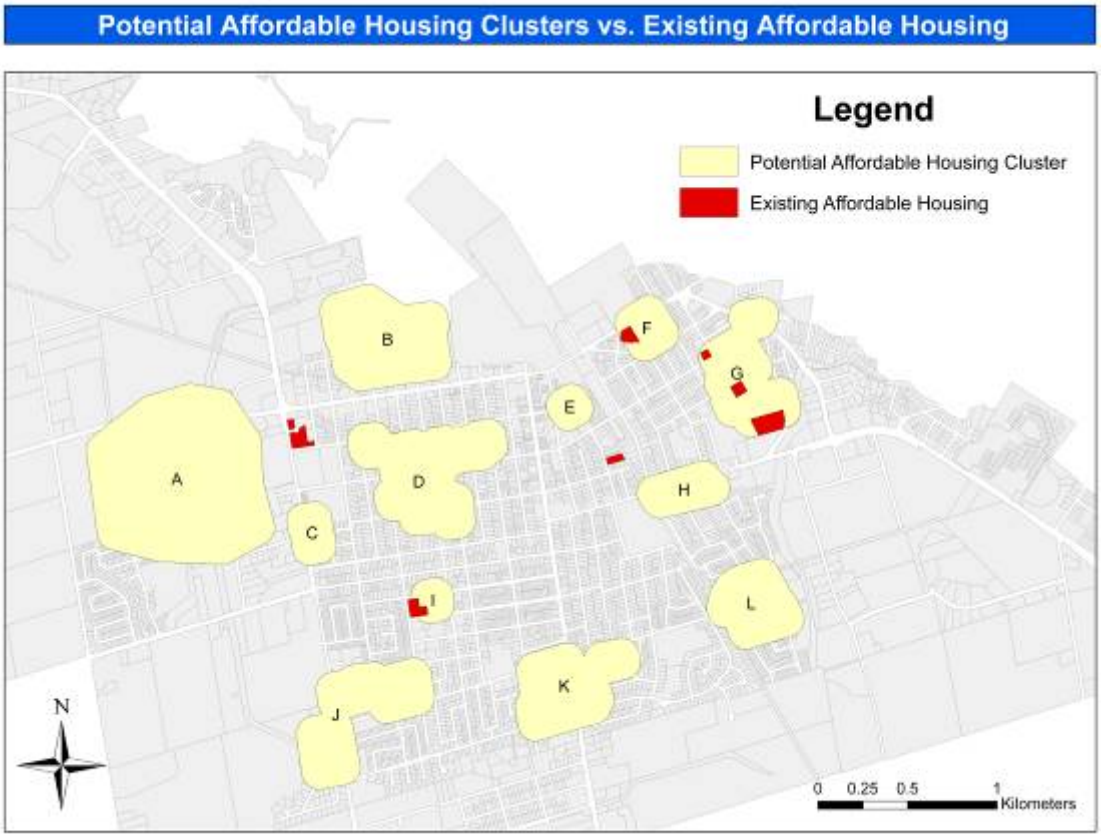


Figure 4.9 – Map of Potential Affordable Housing Clusters and Existing Affordable Housing

Another noteworthy relationship is the relationship between participant selected clusters and land use within the Collingwood. Figure 4.10 indicates that the majority of participant selected clusters are located in the residential land use class. However, a few exceptions do exist, such as Cluster E which is located in the downtown core, Cluster A which covers significant area of industrial land, Cluster J which covers recreation, and Clusters K and H which cover small areas of commercial land. The overall generalization regarding land use appears to be that, not surprisingly, most selections are located within the residential areas of the city.

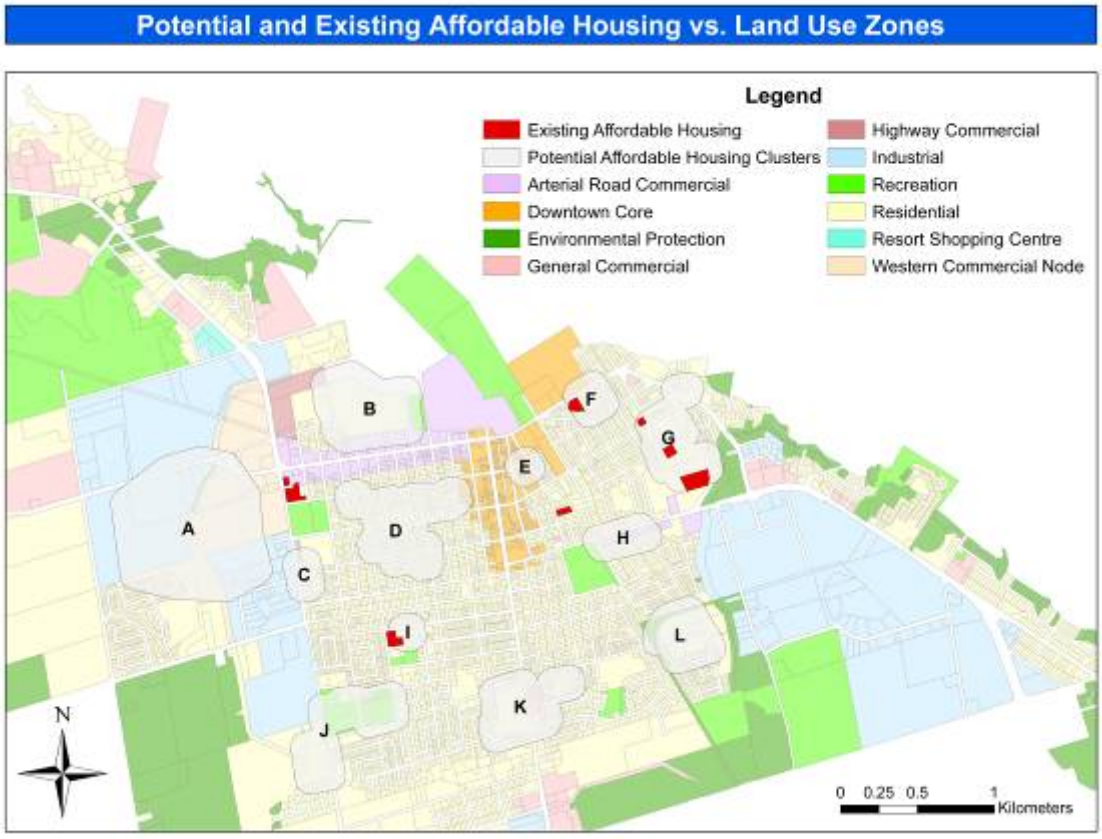


Figure 4.10 – Map of Potential and Existing Housing within Town Land Use Zones

The relationship between existing affordable housing or participant-selected clusters and the public transportation network is important in terms of accessibility. Obviously, if low income groups are to function without a vehicle in the community, they must have a means to obtain needed products and services. As illustrated in Figure 4.11, all existing affordable housing is located directly on the bus route in Collingwood. This could set precedence for future housing. Participant selected clusters are also all within very close proximity of the bus route.

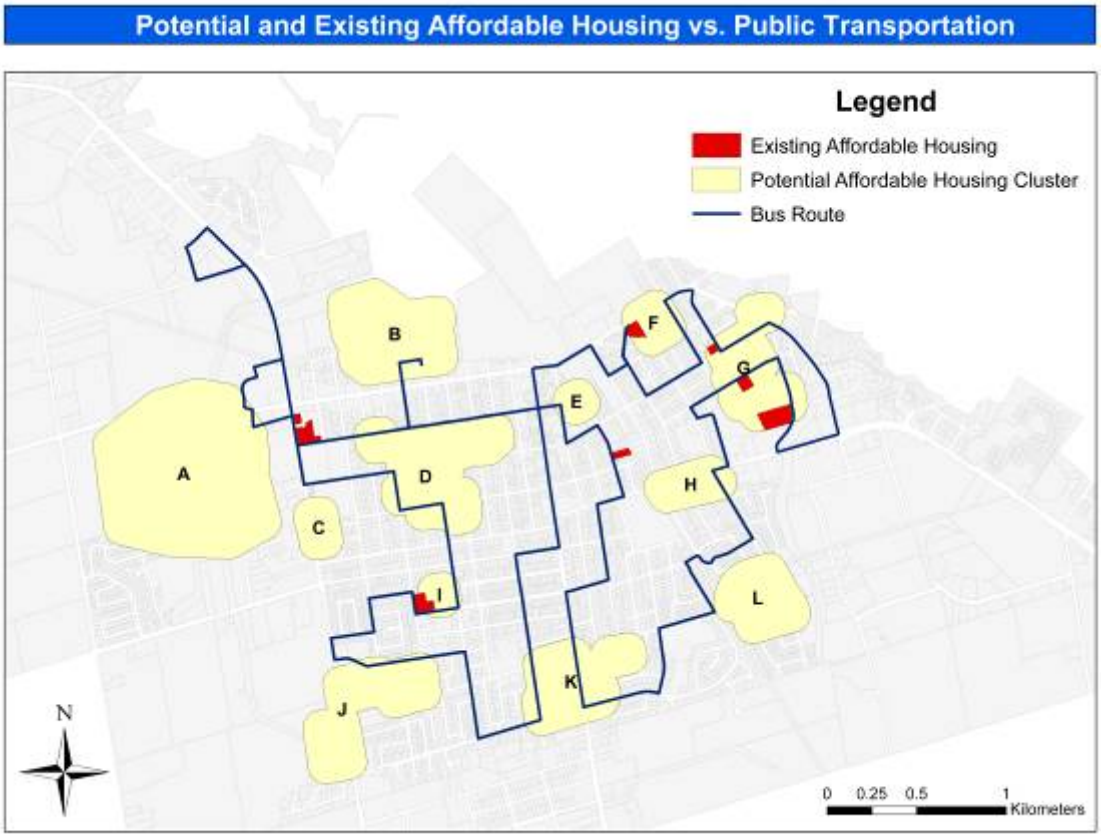


Figure 4.11 – Map of Potential and Existing Affordable Housing with the Bus Route

Community facilities such as child care, schools and grocery stores are vital in the everyday life of community members. Low income groups must be within proximity of community facilities, given their demographic profiles discussed in Chapter 2. Figure 4.12 shows the relationship between participant-selected clusters and community facilities. Cluster J and L appear to be the clusters lacking the most in terms of proximity to community facilities. The proximity of participant selected clusters to child care, schools and grocery stores will be investigated further in section 4.25 - Proximity and Overlay Analysis.

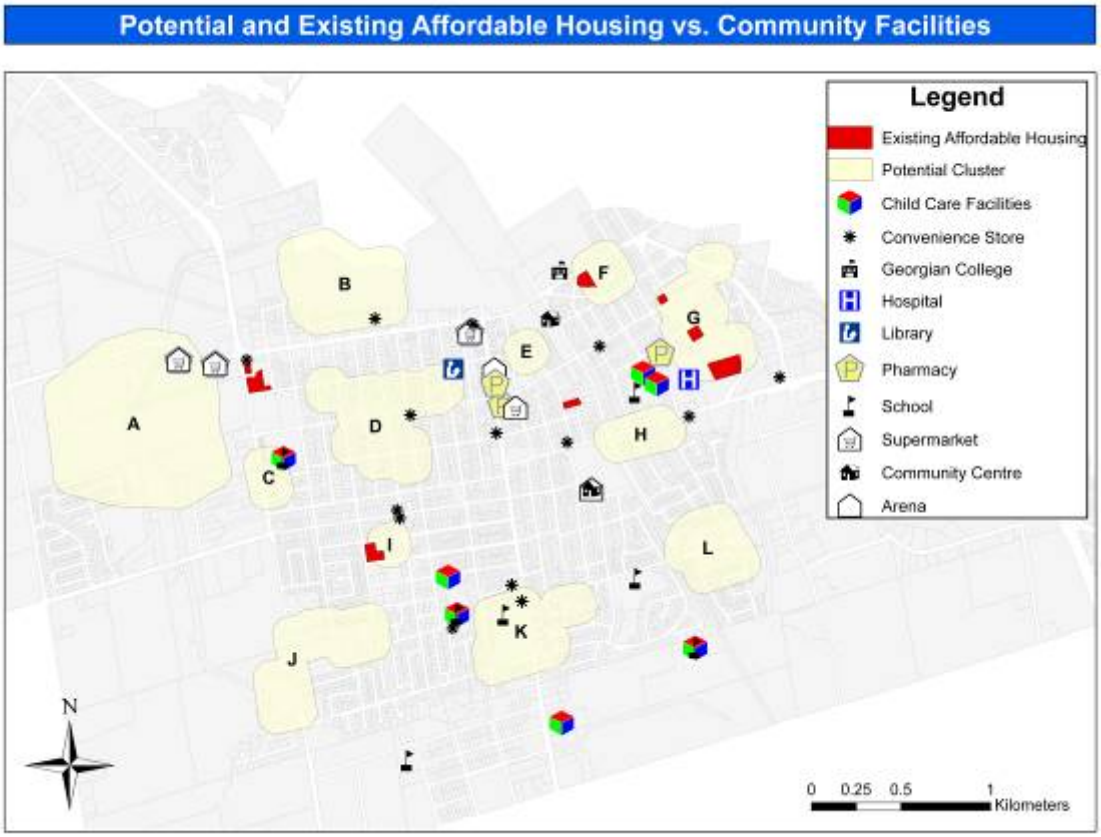


Figure 4.12 – Map of Potential and Existing Affordable Housing with Community Facilities

The final visual comparison of interest is between participant-selected clusters and town-owned land which includes parks, road allowances, town forest, public and educational facilities, waterfront land, and other smaller pieces of land owned by the town. Due to the nature of affordable housing development, town-owned land offers greater potential for the acquisition of land from the city for construction of new housing units, as opposed to privately-owned land. Figure 4.13 shows the relationship between these features. Overall, Cluster B shows the highest degree of intersection with town-owned lands.

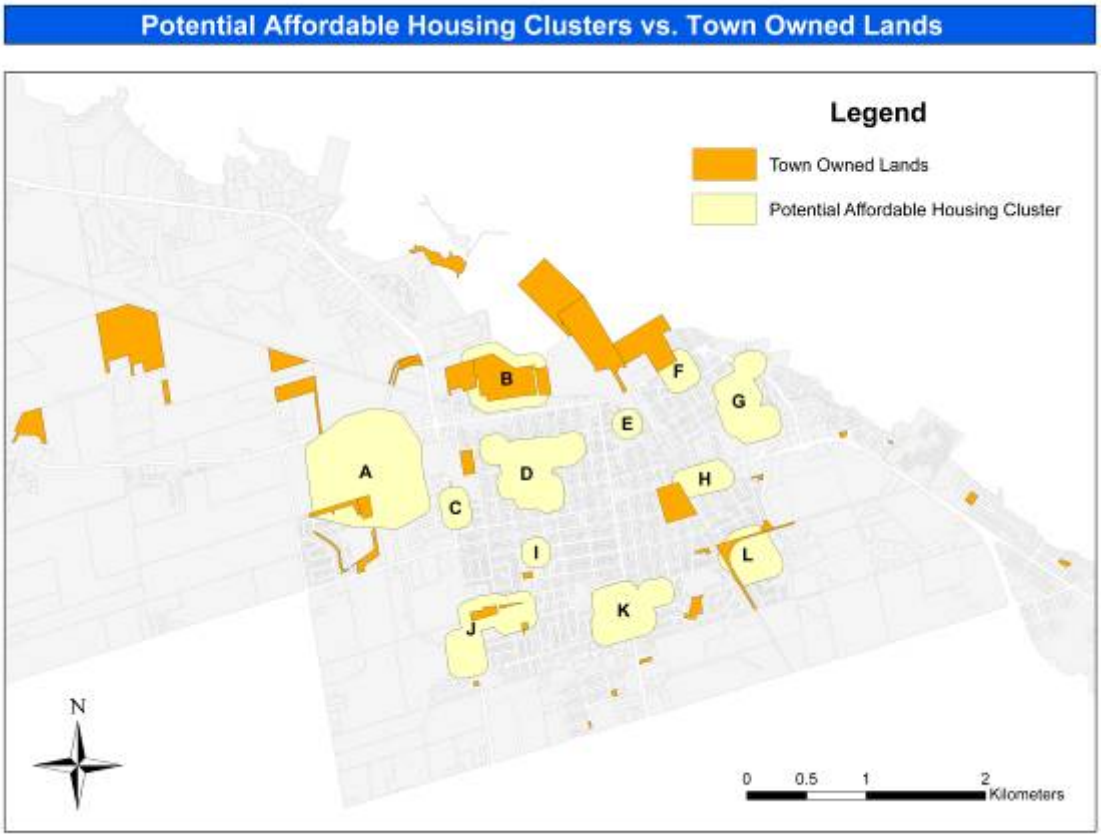


Figure 4.13 – Map of Potential Affordable Housing Clusters and Town Owned Lands

4.2.5 Proximity and Overlay Analysis

Visualization of the relationships between clusters selected by participants and other community features is useful to characterize the potential of selections for new affordable housing development in Collingwood. Proximity and overlay analysis facilitates a more thorough evaluation of the clusters selected by participants. With the goal of avoiding new affordable housing development that is adjacent to existing affordable housing, proximity analysis differentiates participant-selected clusters that are too close to existing affordable housing relative to those that are more dispersed. Second, using overlay analysis, the dispersed clusters are analysed for their proximity to essential community

services (bus route, supermarkets, child care, and schools) and the high density zones that are preferred for affordable housing development by the town. The result identifies locations specified by participants that are dispersed from existing affordable housing, are within proximity to essential community services, and are in zones favoured by the town.

The methods of spatial analysis used in this section are considered multiple layer operations. Chou (1996) states that multiple layer operations, also known as vertical operations, are based on the logical relationships among data layers. These operations provide the most fundamental tools for spatial analysis because they allow for the manipulation of data organized on separate layers and the examination of relationships among different features.

Chou (1996) also mentions that multiple layer operations can be classified into the following three categories: overlay, proximity, and spatial correlation analysis. In general, overlay analysis involves the logical connection and manipulation of spatial data on separate layers. Proximity analysis deals with operational procedures that are based on distance measurement between features on different layers. Spatial correlation analysis determines whether the distribution of one type of feature, organized in a particular data layer is related to the distribution of features organized in another data layer. This can be useful in understanding the correlation between different features for spatial modelling. For example, if two layers are highly correlated, then the information on these layers may be redundant, and using both features to explain the same phenomenon is unnecessary (Chou, 1996).

To differentiate clusters of participant selections that are dispersed from those that are too close to existing affordable housing locations, the distance between polygon features in two separate layers are evaluated using “select by location” in ArcGIS. This spatial query operation selects all existing affordable housing polygons based on their locations relative to clusters of participant affordable housing selections. The threshold distance used for proximity was 100 metres. This distance was used

because it was thought to be an appropriate distance within which to exclude future affordable housing in a community the size of Collingwood. Figure 4.14 outlines the procedure used to differentiate dispersed clusters and those that are too close to existing affordable housing.

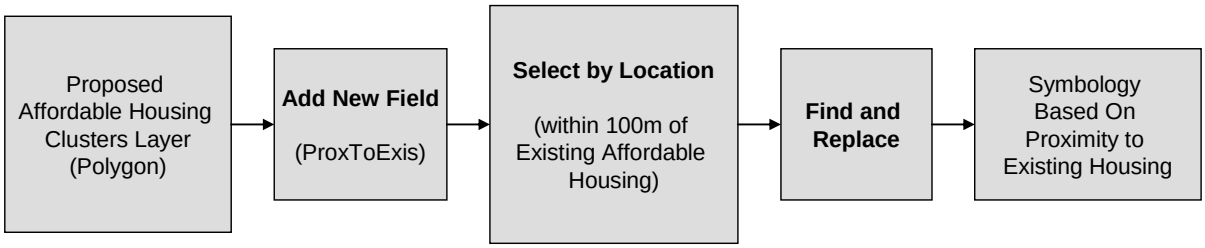


Figure 4.14 – Procedure for Selecting Dispersed Potential Clusters

As noted in Figure 4.14 the input layer for proximity analysis is the proposed affordable housing cluster layer. A new field called (called ProxToExis) is then added to the layer in order to store new proximity information (Dispersed or Too Close). The Find and Replace tool was then used to change attribute values of the ProxToExis field in order to reflect proximity to existing affordable housing.

The new attribute values in the field (Dispersed or Too Close) were then used for symbology or appearance of the layer. The resulting map showing clusters that are dispersed and those that are too close to existing affordable housing is shown in Figure 4.15.

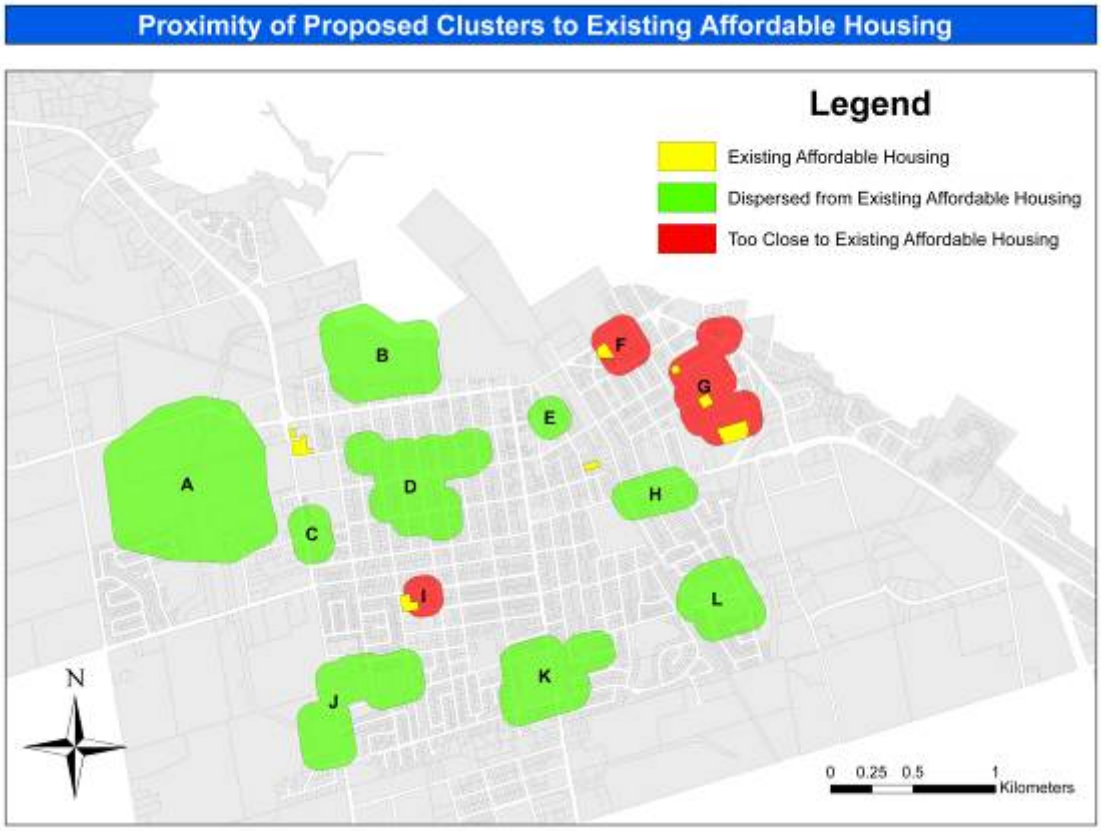


Figure 4.15 – Map Showing Dispersed Potential Affordable Housing Clusters

The refined dispersed clusters have a much higher potential to be developed for future affordable housing because they are not clustered with existing affordable housing. Dispersed clusters should also be further refined to suit a number of other community factors. Affordable housing must not only be within proximity of essential community services, but it must also be located in accordance with the Official Plan of the Town of Collingwood. Hence, using buffer and overlay analysis, dispersed participant selected clusters are now reduced further to meet a number of key community criteria.

Overlay analysis uses two or more spatial data layers to find common or uncommon geographical areas, resulting in a new set of information. Using ArcGIS, an overlay operation was performed to

determine which areas inside dispersed clusters are within proximity to a combination of essential community services. The result of the overlay defines areas that are selected by participants, suitable from a community planning perspective and geographically practical for low income groups to function in the community. The criteria used to determine suitable locations from dispersed clusters are displayed below:

1) Within Medium to High Density Areas
2) Within 100m of the Bus Route
3) Within 1km of Childcare
4) Within 1km of School
5) Within 1km of a Supermarket

The rationale for the criteria was to fulfill objectives of the Official Plan by locating housing within medium and high density areas. To be practical for low income groups, locations needed to be a short walk (100m) to the bus route and within reasonable walking distance (1km) to childcare facilities, schools and supermarkets.

To determine suitable locations based on these criteria, a number of buffer operations were performed prior to overlay. The buffering of the bus route, supermarkets, schools and child care each produced a zone which was considered to be a practical distance to affordable housing. Locations that satisfied the requirements of all criteria (within all buffer zones) and were located within medium or high density areas would be considered the most suitable. Figure 4.18 illustrates the procedure used to locate the most suitable affordable housing locations within the dispersed clusters selected by participants.

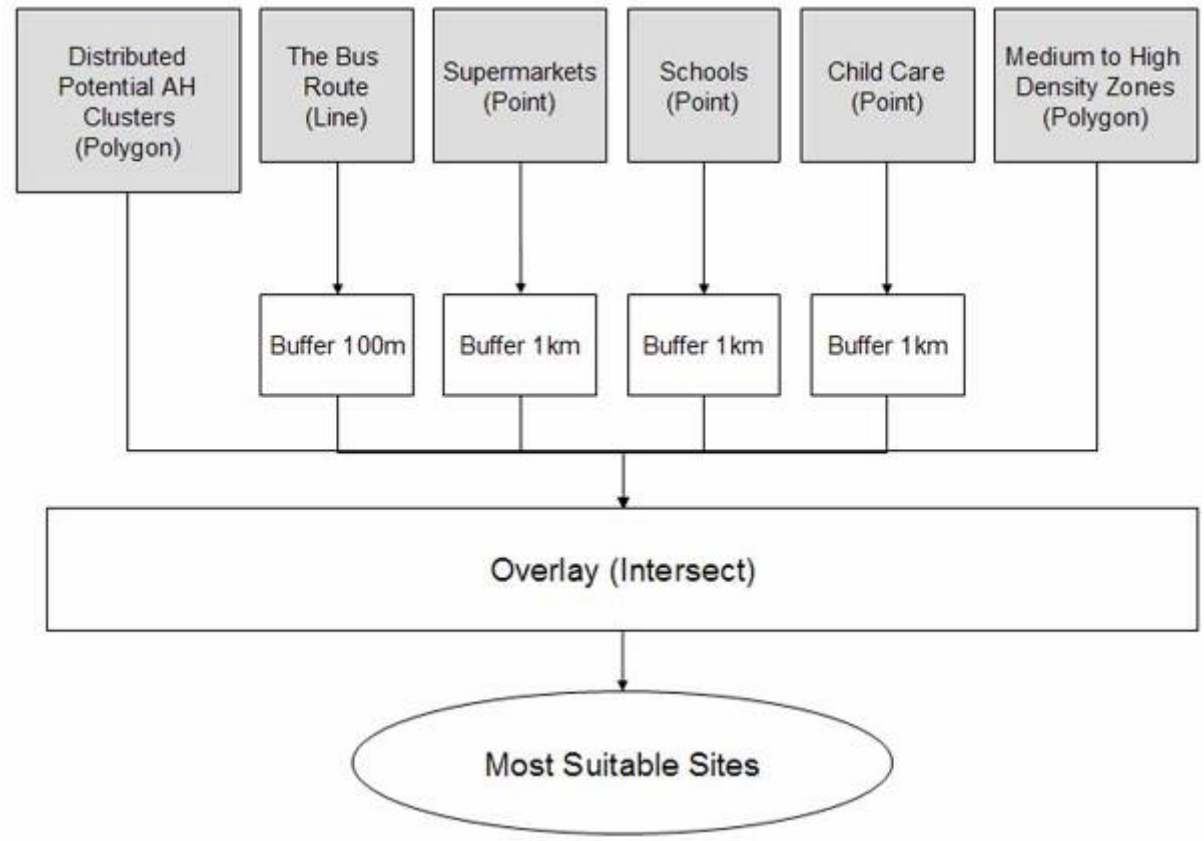


Figure 4.16 – Procedure to Determine Most Suitable Locations within Dispersed Clusters

The buffer and overlay operations within ArcGIS were used to complete the procedural tasks outlined in Figure 4.16. First, the bus route was buffered to a distance of 100m and the supermarket, school and child care layers were buffered to a distance of 1km. Following the buffering of the bus route, supermarkets, schools and childcare, all data layers were integrated together using the Intersect command within ArcGIS. The map layer produced is displayed in Figure 4.17.

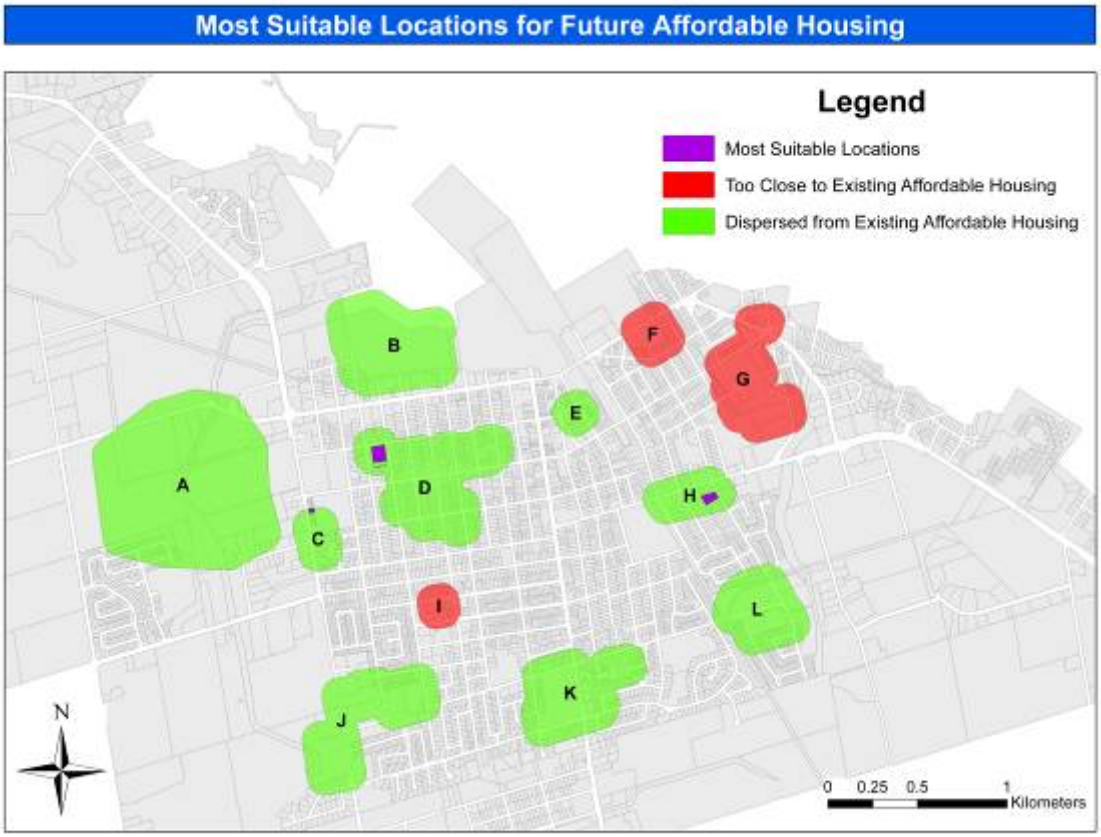


Figure 4.17 – Map Showing Dispersed Potential Housing Clusters

As illustrated in Figure 4.17, there are three suitable locations identified as satisfying all criteria defined in the study. These are the purple locations within dispersed (green) clusters.

One last step was carried out for proximity analysis. The three most suitable sites were related back to a data layer that was acquired late in the study. This layer identified town-owned lands. Again, using buffer analysis, the three most suitable sites were buffered to a distance of 500 metres. All town-owned land falling within these zones should be of particular interest to the town for development purposes. These parcels are the most appropriate in satisfying the practical needs of low

income families, the town, and dispersion for the community. Figure 4.18 shows the results of this final analysis step involving town-owned lands.

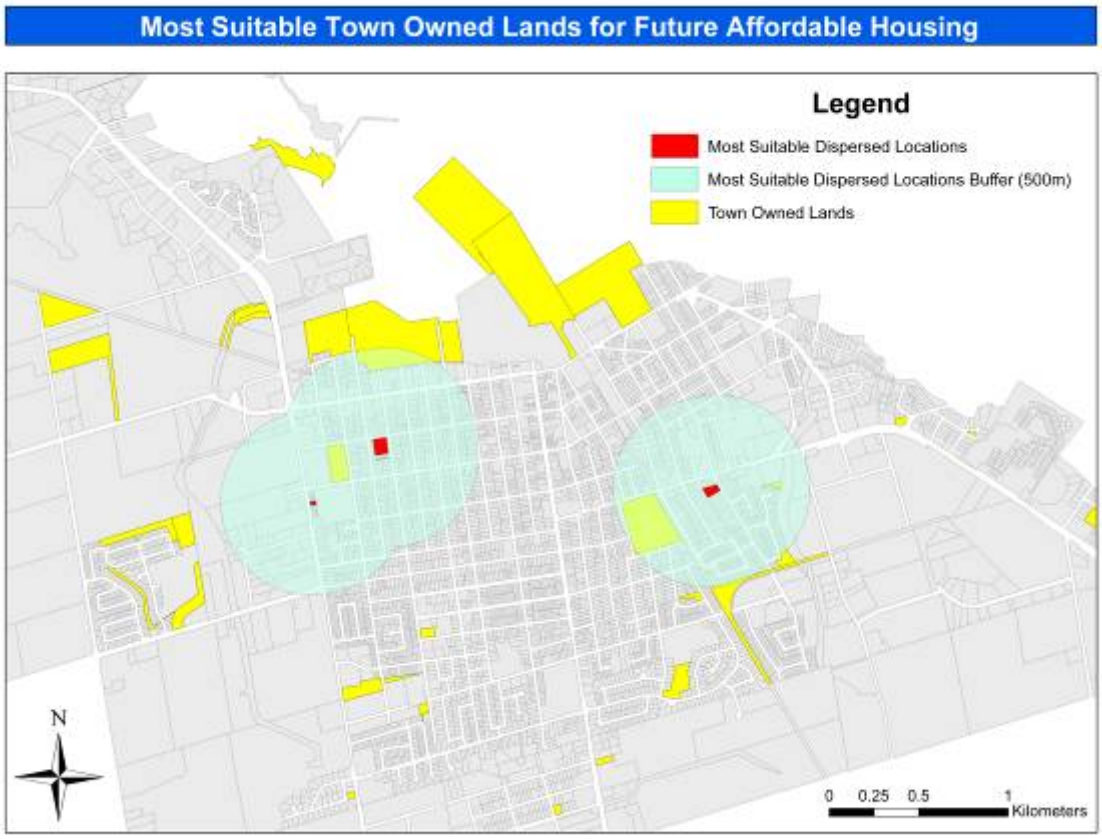


Figure 4.18 – Map Showing Most Suitable Town Owned Lands for Affordable Housing

4.3 Comment Analysis

Comment analysis examines the content of messages contributed and exchanged by participants in the study. Comment analysis is qualitative in nature and significantly more subjective. However, it is an important aspect of the analysis. First, this section maps which participant selections had associated comments. Subsequent to mapping, an evaluation is performed which subjectively categorizes comments into high, medium and low regarding their relevancy and level of detail. In

addition, comments during the group session are categorized into ‘yes’ or ‘no’ regarding whether they were part of a discussion.

Figure 4.19 shows the distribution of participant selections with and without associated comments.

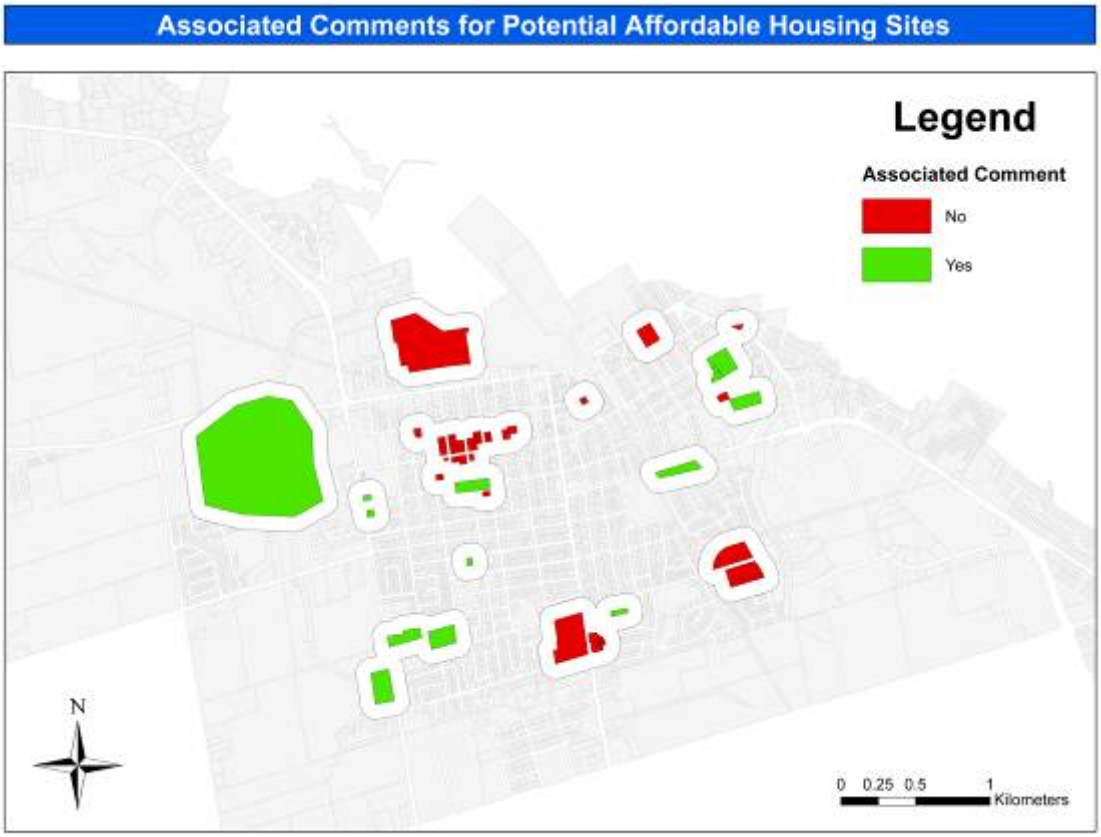


Figure 4.19 – Map Showing Participant Selections with Associated Comment

Comment analysis is a difficult task as it requires a subjective evaluation of each comment. To make the process easier, each comment was ranked as either low, medium or high regarding both the relevance of the comment and the level of detail provided.

Comments considered to be highly relevant apply directly to the problem of locating affordable housing within Collingwood. Comments with medium relevance discuss more general or related

affordable housing issues, and low relevance comments are considered less applicable and may include short or very open-ended questions. The level of detail provided in comments is the other measure of comment usefulness. Highly detailed comments provide considerable information about a particular selection and may cover details such as contact names, addresses, real estate prices, zoning details, or even community feelings about the site. Medium detail comments provide information with an average level of detail. Finally, low detail comments present little or no useful information or detail on a selection.

Using the strategy outlined above, each comment was evaluated regarding its relevance and detail. Appendix C contains the categorization of the comments provided in the workshop and individual online session. Figure 4.20 displays a histogram summarizing the results of comment categorization for the two sessions.

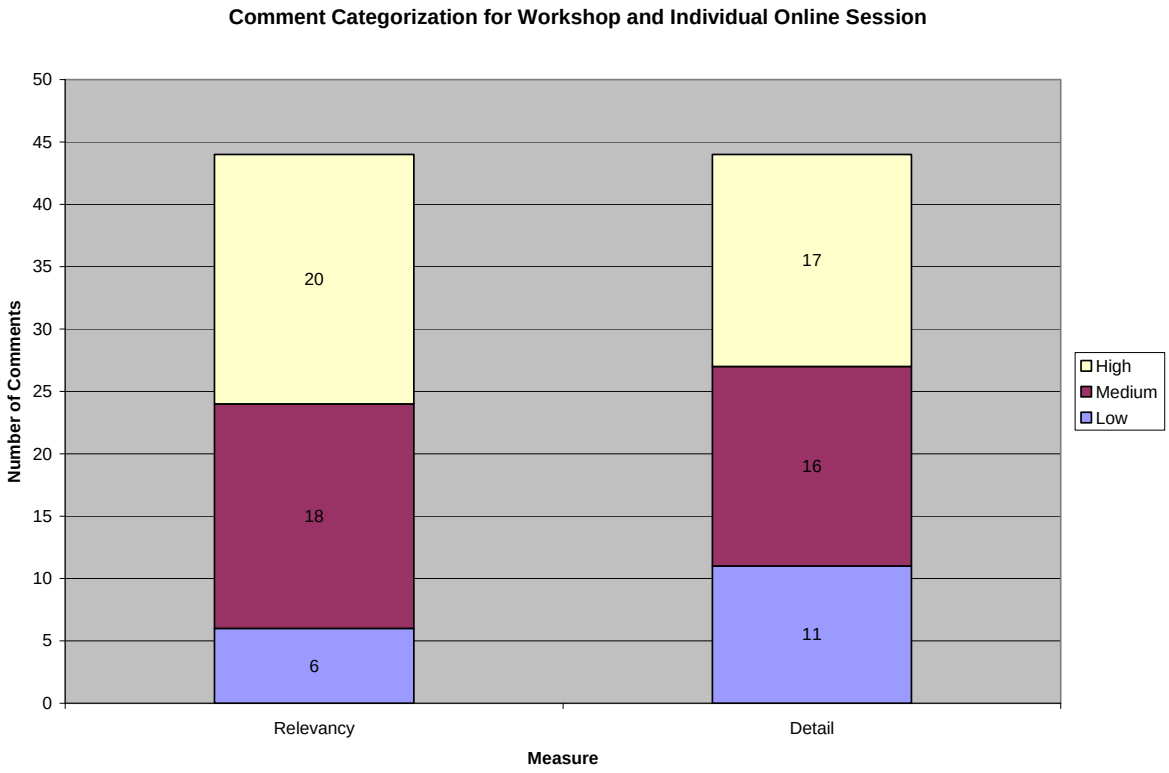


Figure 4.20 – Categorization Results for Workshop and Individual Online Session

During the workshop and individual online sessions, 20 comments were classified as being high relevancy while 18 were of a medium relevancy and 6 were low relevancy. Concerning the level of detail, 17 comments were considered highly detailed while 16 were medium and 11 had low detail. In addition to the categorizations given in Figure 4.20, it can also be noted that several comments were considered to be both highly relevant and highly detailed.

Appendix D presents an evaluation of comments provided in the online group session. Due to the fact that the group session was intended to foster discussion, each comment here was also assigned a yes or no regarding whether it was a response to a comment and therefore contributed as part of a discussion. Figure 4.22 presents a histogram summarizing the results of comment categorization for the group online session.

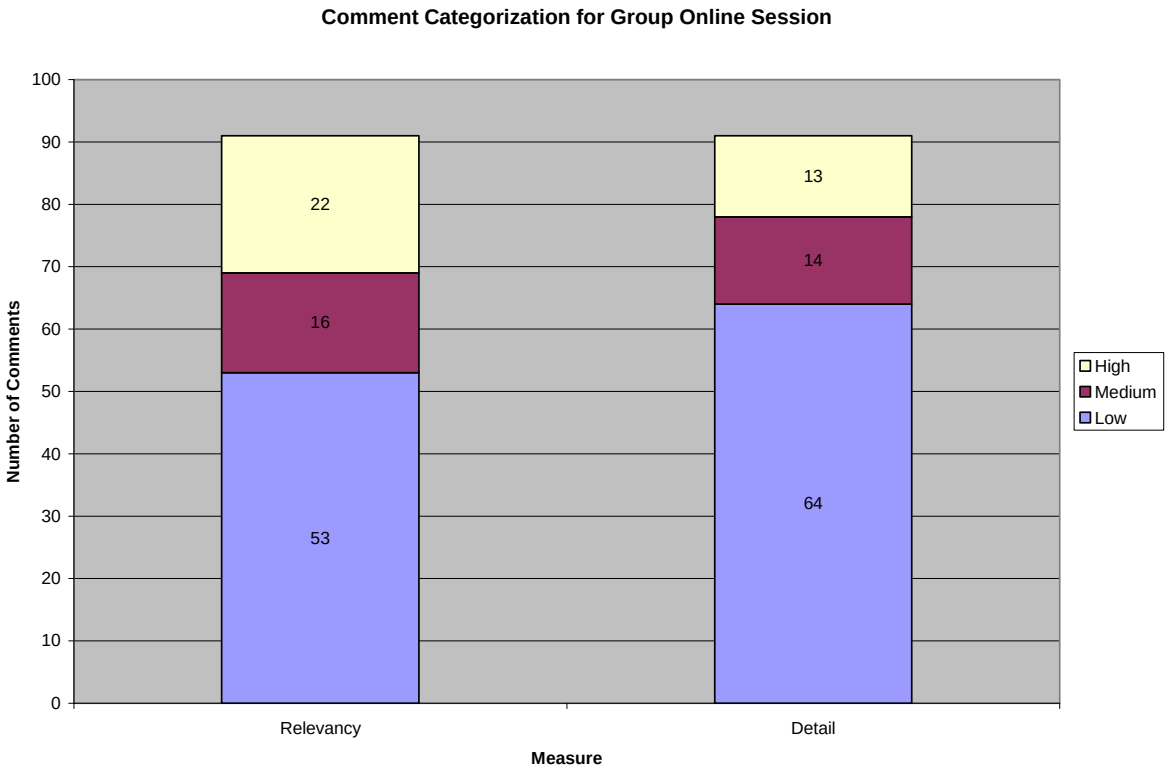


Figure 4.21 - Categorization Results for Group Online Session

During the group online session, 22 high relevancy comments were made, 16 medium and 53 low. Regarding detail, 13 comments were considered highly detailed, while 4 were medium and 64 were low. Also according to Appendix D, twelve comments were classified as having both high relevancy and high detail. These comments are of particular importance as they provide further details for specific affordable housing sites or respond to comments made in the workshop or individual online session with extra information.

The level of discussion in the group online session can be generally evaluated through the discussion categorization into yes or no. From Appendix D, it can be observed that the majority of comments are given a yes value and are therefore part of a discussion. Figure 4.23 shows a histogram

with the specific breakdown of comments considered discussion versus comments that were not considered discussion.

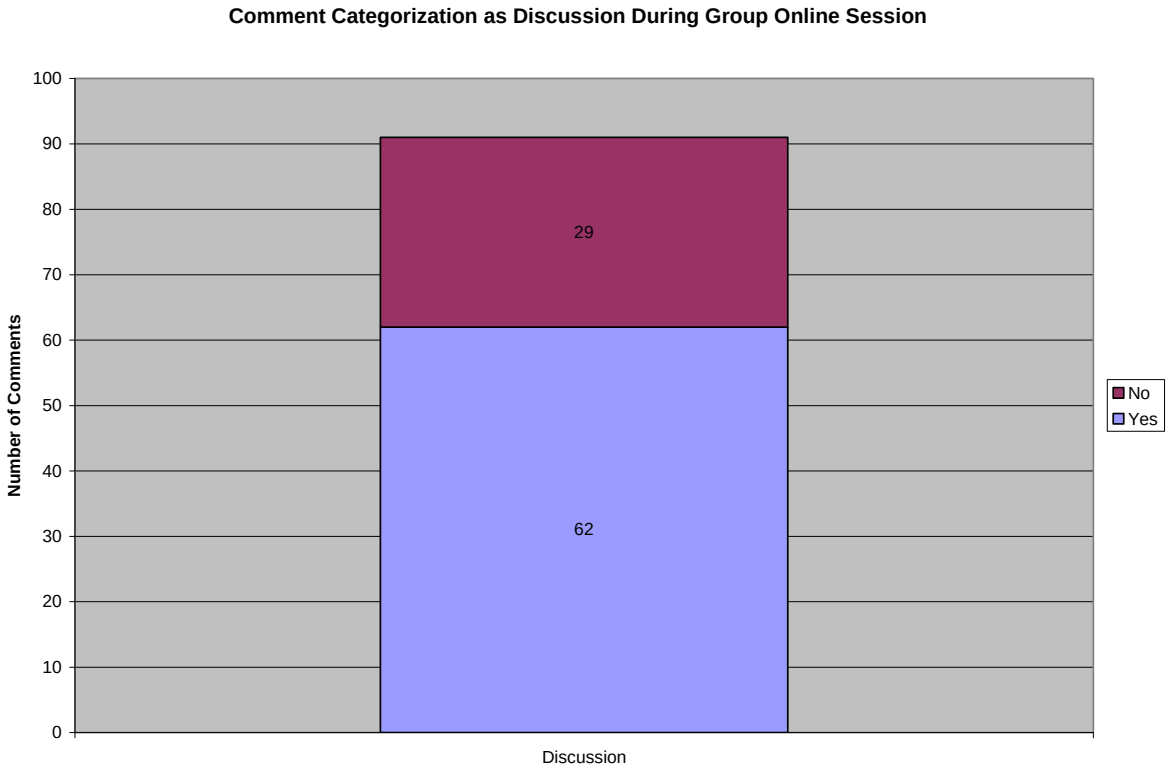


Figure 4.22 - Categorization of Discussion during Group Online Session

A discussion of the results including those covered during comment analysis is now presented in Section 4.4.

4.4 Discussion of Results

To this point, Chapter 4 has presented participation analysis, spatial analysis, and comment analysis using data collected in the study. The results of each component of the analysis are now discussed in more detail to expand on key findings uncovered in the analysis.

The initial workshop phase of the study involved participatory learning and collecting contributions from the participants. Participatory learning was successful in that there was keen listening during the workshop presentation and active involvement in learning MapChat functions such as the map navigation tools. Participant contributions consist of feature selection, and annotations during the workshop with the selection of 93 sites and 37 comments made on those selections. The selections formed a considerable collection of sites and contained a great deal of community knowledge which was used later for spatial analysis.

The participation during the initial workshop could be attributed to a number of factors such as a dedicated interest in affordable housing issues and favourable attitudes toward using a new approach to a difficult community problem. The level of productivity during the workshop session seemed to indicate that participants were genuinely interested in achieving the goals of the study and needs of the community. In addition, the MapChat interface provided an information-rich environment for exploring the problem spatially, which visibly stimulated participants and perhaps fostered a higher level of active involvement in the workshop session than would have otherwise been the case.

The individual online session of the study had a greatly reduced level of participatory involvement. Only two individuals took part in this session, submitting a total of eight comments. A number of reasons exist for the general lack of participation in this phase of the study, but the most prominent likely relate to Internet access and hardware limitations or a lack of technological experience.

Haklay (2006) mentions, for example, that speed of access continues to constrain collaborative GIS despite all of the significant developments in the field. Evidence concerning Internet and hardware limitations did exist in the study. Comment 41 in Appendix D states: “My accessibility to effective communication is limited - probably because of the 'antiquity' of my computer - I get comments on about half of the ‘blue dots’ and every action takes 'forever'.” In addition, comment 88 in Appendix D

asserts: “I have Bell and my ISP working on why my download speed is so variable at home.” As illustrated, hardware and the Internet or a combination of both were a constraint in the study, and were therefore likely factors in the reduced participation observed during the individual online session. Haklay (2006) also maintains that an application that does not work on older computers and/or slow Internet access may further alienate users, and send the message that ‘you can only participate in the process if you have access to the latest technology.’

Another valid explanation for reduced participation during the individual online session is a lack of technological experience. This may have involved unfamiliarity with computers, the Internet, or the MapChat tool but, regardless, a limited amount of experience often leads to insecurity, apprehensiveness, and reduced participation. Neilson (2000) states that users may use a system only once or very rarely and such limited use reduces the effort that the user is willing to invest in learning and using.

The last phase of the study was the group online session. This session was equally vulnerable to Internet and hardware limitations and lack of technological experience. However there was a notable improvement in both number of participants and number of comments contributed by participants in comparison to the individual online session. During the group session there were four participants contributing 39 comments, and two administrators contributing an additional 40 comments. It is possible that a strong desire by participants to view the annotation results (from all participants) was a factor in the increased participation but this cannot be proven.

In addition to the increased number of participants, there were also an increased number of submitted comments. The online group session seemed to display rapid participation and less lag time between comments compared to previous sessions. It is possible that this trend was the result of less interaction with map functionality and increased interaction with chat functionality in the MapChat

tool, which is perhaps easier and faster to submit and more familiar to participants. The result was extensive dialogue between participants while still retaining all previously created links to spatial features. The focus of the group online session was discussion of sites rather than their creation.

Spatial analysis consisted of 'cleaning' the original data, completing calculations for existing and participant selected potential affordable housing locations, analysing the global distribution of existing and participant-selected potential affordable housing, creating clusters of participant-selected sites, and analysing clusters with a set of community criteria to determine the most suitable participant-selected locations for future affordable housing within the community.

Calculations performed on existing affordable housing features showed that 277 existing affordable housing units are located on 13.45 acres of land, with an average site size of 1.68 acres and 35 units. Existing affordable housing occupies 0.175% of the total land area in the community. These calculations further characterize the seriousness of the problem in Collingwood and, coupled with statistics collected by the GTHRC, show the urgency for new affordable housing development. The GTHRC registered 872 residents in need of affordable housing in Collingwood in 2006. With a low vacancy rate and a land area of less than 0.2% dedicated to affordable housing, options for affordable housing are extremely limited in the town. The combination of land and resident statistics illustrate that the problem is a difficult one perhaps requiring either higher density development on existing land or the acquisition of new land for development.

Calculations completed on participant-selected affordable housing sites show that the average proposed site size was 3.17 acres. It is possible that study participants thought that larger site size was a requirement for future affordable housing but conversely this may have been a function of unfamiliarity with the polygon selection tool available in MapChat. If larger site size was intended,

perhaps participants understood affordable housing to be a large scale problem, requiring large sites to accommodate a greater number of people.

The results of a nearest neighbour global statistic on existing affordable housing within Collingwood indicated a somewhat dispersed distribution of features. Although there are benefits for those living in neighbourhoods of concentrated low income or poverty, such as increased social cohesion, community networks or access to commonly needed services (Ford, 2003), extensive downsides also exist such as high levels of unemployment, high school dropouts, teenage pregnancies, increased crime and drug use, decreased motivation to change one's circumstances and stigma from the broader community (Kazemipur, 2000). In Collingwood, the somewhat dispersed distribution of existing affordable housing is beneficial to the community. Although there is a considerable lack of affordable housing, what is in place functions to integrate all residents into mixed neighbourhoods.

The nearest neighbour global statistic for participant-selected affordable housing was also calculated during spatial analysis. The resulting distribution was found to be clustered, indicating that participants consistently selected certain zones or clusters within the town. This pattern implied that it was logical to conduct further analysis using clusters rather than individual sites in order to permit more effective visual comparisons between locations and community features and facilitate a simplified approach for locating the most suitable locations within the community.

The results of visual comparisons between participant-selected clusters and other community features found that all clusters had high potential. Due to the central location of clusters, all appeared to have a reasonable location relative to community services, transportation, and the residential land use class in the official town plan. Due to the unquantifiable nature of a visual comparison, it was determined that further analysis using proximity and overlay methods was needed to determine the

most suitable locations within participant-selected clusters. Regardless, visual comparisons provided a useful means by which to compare features in the community.

Proximity and overlay analysis found that 3 of the 12 participant-selected clusters were within 100 metres of existing affordable housing and were therefore unsuitable to be considered as future affordable housing locations. A further refinement of the remaining 9 clusters using proximity analysis to community features (bus routes, supermarkets, schools, child care and med-high density zones) found that three suitable locations were identified as satisfying all criteria defined in the study. These locations were within participant-selected clusters, were dispersed from existing affordable housing, were within proximity to essential community services and were within the medium and high density zones that are favoured by the town.

The identification of 3 optimal sites in the community is interesting because it shows that compromise is possible in formulating alternatives using a number of diverse community criteria. Even though it may not be possible to obtain the most suitable sites that have been identified, it may be possible to obtain land within close proximity to these sites. Otherwise, the parameters of the cluster mapping or proximity analysis could be altered slightly to expand the number of alternatives. Regardless, the spatial analysis in the study provides a framework for integrating multi-source data in a simple and manageable way to provide potential options for locating affordable housing.

Mapped selections with associated comments were examined by conducting a categorization based on relevance and level of detail provided by the participants. This showed that approximately half of the participant selections had a comment associated with them. Hence, a moderate level of annotation of selected sites was generated and this may suggest that overall, the participants had a considerable amount of site-specific knowledge to contribute to the process.

The distribution of participant selections with and without associated comments showed that commented selections appeared to be located mostly on the fringe of town, while non-commented selections were somewhat more central. This suggests that fringe areas may have a higher potential for affordable housing development or, conversely, it could simply indicate that participants were less knowledgeable about the downtown area and therefore did not provide comments for many of these sites. At a more general level, certain clusters contained a higher number of commented selections than others. Of particular interest is Cluster J, which had three commented selections and no non-commented selections. It is possible that locations within Cluster J may have high potential and or divergent views on the part of participants but this would require further research.

Subsequent to mapping, the categorization of comments provided during the workshop and individual online sessions revealed that 20 comments were classified as being highly relevant while 17 comments were considered highly detailed. In addition, according to the results shown in Appendix C, twelve comments were classified as having both high relevance and high detail during the workshop and individual online sessions. During the group online session, 22 highly relevant comments were made and 13 comments were considered highly detailed. Appendix D also indicates that twelve comments were considered highly relevant and highly detailed during the group online session.

The results of comment categorization indicate that an extensive amount of valuable local knowledge was contributed during the study. These comments provided considerable information that is useful to planners and local politicians, such as land owner names and contact numbers. For example, one comment in Appendix C states: “This parcel here is listed with Brad Williams 444 46xx. It is on High Street and says it can accommodate a 15 unit walk up scenario. Beside it is an old

sign for westview terrace listed with Bob Allen 445 43xx. The location is good for shopping, work in the mall area, greenspace, and some schools."

A number of important issues were raised in the content of the comments posted during the MapChat sessions. Due to the volume of comments, it was necessary to classify comments based on their relevance and detail. Comments considered highly relevant and detailed are listed in Table 4.4 and identified on the map displayed in Figure 4.23.

Comment #	Comment
4	The west side of this park has been zoned multi-res for the last 25 years, but was rezoned by the town at the request of neighbours who opposed its being developed as affordable housing.
5	This is the section that was to accommodate 54 units under the Canada-Ontario Affordable Housing agreement. It was rezoned from multi-res to parkland at the request of neighbours.
10	This looks like it is in the town's official plan for multi units and affordable housing. It is close to the schools and to town and shopping. It has been left undeveloped for many years since the surrounding area has been developed. It is for sale. I am not sure of the zoning or density.
24	The markings for this property are not very accurate but this is the south end of the soccer field that became so controversial and the vacant land beside it that is privately owned. If this privately owned parcel could be acquired affordably there would be a fair amount of land available to develop. The youth soccer field could be reconfigured to run East to West on Ontario Street with the elimination of the tennis court that is no longer used and repositioning the playground to located behind
25	There are a number of existing dwellings that could be upgraded/renovated to provide a mix of rent geared to income and market value rental/purchase (freehold/condo) dwelling units.
27	Just for general knowledge there are a few affordable housing sites that are not identified on the map or are identified in the wrong location. 250 Erie Street is marked on the corner beside Sunset Manor. In fact it is directly across from the ball diamond. The property on the corner of Albert and Ontario Street is actually on the North west corner rather than the east corner, there is one additional building at the end of Napier Street close to the Pretty River Parkway. There is no access from
31	I believe this property is already owned by the municipality which would make it an easier candidate for conversion to a variety of market value housing and municipal affordable housing units. This would be a more appropriate location for higher density/height development while respecting the heritage character of the local community.
37	Here is a parcel of undeveloped land that I believe is privately owned but I don't know how it is zoned. It does fit the citeria of being close to schools and bus routes.
39	This parcel of land is currently for sale, privately owned. The parcel beside it is sold but nothing has been developed there either. This is zoned multi-residential and was in fact identified for an 80 unit non-profit prior to the Harris government being elected. The funding for that project which was being sponsored by the Labour Council was cancelled by the Harris government.
40	This parcel here is listed with Brad Williams 444 46xx. It is on High Street and says it can accommodate a 15 unit walk up scenario. Beside it is an old sign for westview terrace listed with Bob Allen 445 43xx. The location is good for shopping, work in the mall area, greenspace, and some schools.
41	This is 400 2nd Street the old King George School owned and operated by rad whitehead. It has recently had a new roof put on it and looks like it could accomodate 8 more unit or so. Zoning may be holding this up from happening.

42	This is listed with Alex Hunter Prudential 446 30xx. It is right across from the High School and a short walk downtown. The entrance to an affluent subdivision probably dictates that this building would have to be an aesthetic "value statement" on the entrance to their neighbourhood.
43	I think this is the site of "the Trails" with studios from $127 K. Perhaps an early purchase agreement for a floor in the building with units to be finished by us would yield a great price for us and early construction start for the developer (meeting presales earlier) this has been done in the US to good success as the concept creates a mixed income building and a diverse neighbourhood.

Table 4.2 – Highly Relevant and Detailed Comments from Workshop Session

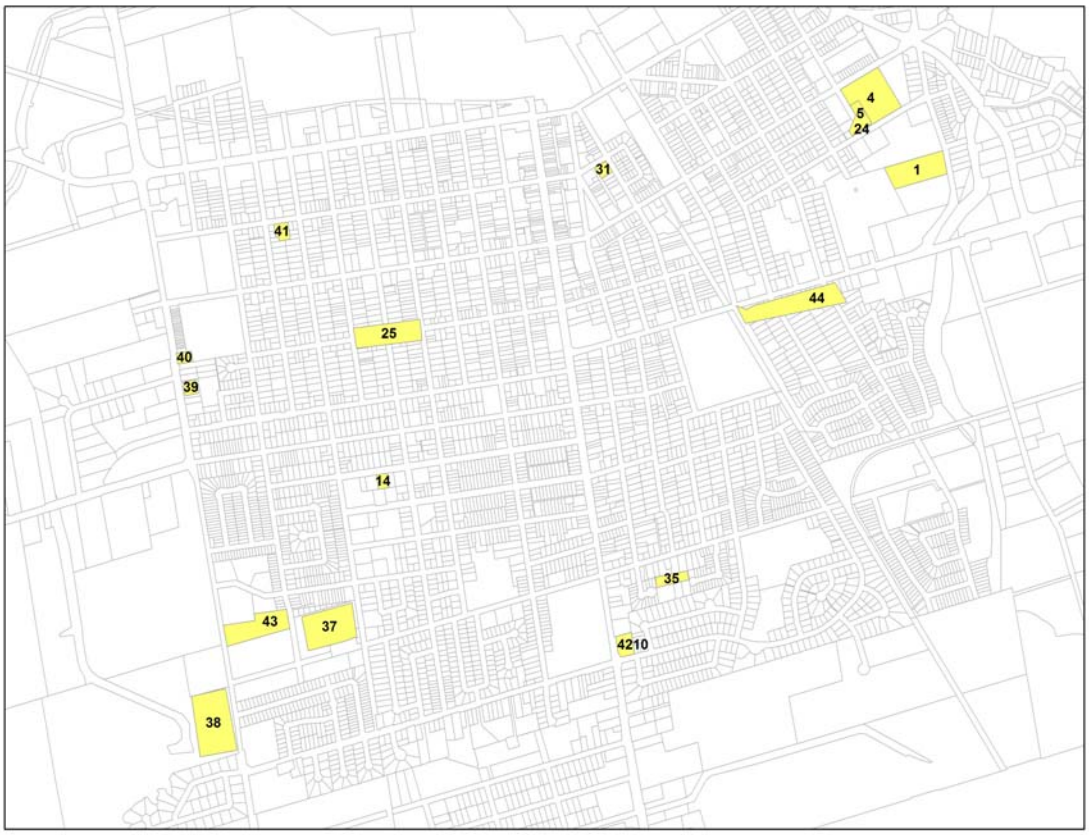


Figure 4.23 – Locations of Highly Relevant and Detailed Comments from Workshop Session

A number of important issues were communicated through the comments considered to be highly relevant and highly detailed. These covered the themes of planning, geography, redevelopment and conversion, and land ownership.

Planning issues were a dominant theme contained in the comments offered by study participants. This indicates that participants were aware of the planning issues surrounding affordable housing development. Their comments discussed locations that are currently zoned for multi-residential development and areas that have undergone rezoning, away from multi-residential designations, as a result of neighbourhood pressure. One comment made reference to a long-time undeveloped location, inquiring about its zoning designation, while another identified a multi-residential location which was to be developed as affordable housing, however funding was cancelled. Also mentioned in the comments were planning concepts such as community aesthetics, green space, and diverse neighbourhoods.

Geography-related issues focused on content which detailed the locations of certain participant-selection. This involved the identification of addresses, orientation and landmarks in order to clarify selected locations and allow other participants to make mental reference to the location. Geography-related content also involved the correction of spatial information presented on digital maps within MapChat. One participant, knowledgeable regarding the existing supply of affordable housing, identified a few affordable housing sites that were not identified on the map or were identified in the wrong location. Again, this was done using addresses, orientation and landmarks. Detailed descriptions related to geography clearly indicated that study participants were knowledgeable about the geography of their community.

Redevelopment and conversion was another theme identified in the comments provided by participants. As outlined in the literature review, redevelopment of areas such as former industrial or commercial land, brownfields, vacant lots, and surplus government owned land all present opportunities to redevelop sites. In addition, the conversion of non-residential buildings involves the adaptive reuse of surplus or outmoded buildings such as old schools, hospitals, inns or warehouses

into affordable housing. Both redevelopment and conversion are more affordable than constructing new housing because the building shell is already in place, the building is already serviced and there is usually less neighbourhood resistance. Comments relating to redevelopment and conversion focused on a controversial piece of vacant land, a property owned by the municipality and a number of existing dwellings that could be upgraded or renovated to provide a mix of rent geared to income and rental/purchase dwelling units. References to redevelopment and conversion indicated that participants had previous affordable housing development as these locations are more affordable and therefore more feasible to develop.

Land ownership was yet another theme identified in the comments provided by study participants. These comments often identified land as being either public or private land. A number of comments identify privately owned land with contact numbers and even the costs of the property were presented. Other comments identified public land such as municipally owned land and the land of an old school that may have potential for development. Although publicly owned land may have higher potential, private land has potential as well. Identifying a number of potential privately owned locations increases the odds to obtain land for affordable housing development. Again the local knowledge in identifying these sites is invaluable and a definite asset in the development of future affordable housing within the community.

As illustrated, extensive local knowledge was generated from the interaction of participants with the spatial data and with each other. Although it is not specifically known how traditional planning methods would directly compare in terms of collecting local knowledge relative to the approach used by MapChat, it would be of great interest to be able to draw such comparisons.

4.5 Overall Discussion

The previous section explained some of the key findings of the study. These findings are now put into the broader context the thesis. The thesis objectives stated in Chapter 1 were: 1) To define a collaborative, spatially-aware approach to create and assess affordable housing options in Collingwood, Ontario; 2) To implement the designed approach in a real-world setting; and 3) To examine the spatial patterns of existing affordable housing and the locations identified in the study to determine sites that are most suitable for future affordable housing development in Collingwood. The following discussion incorporates the results of the study into these broader thesis objectives.

The first objective of the thesis was to define a collaborative approach to create and assess affordable housing scenarios in Collingwood, Ontario. A three-phase research design was developed to incorporate existing spatial data, participant input, and open source geospatial software into the study. It was important that the research design be suitable for real-world implementation, present spatial information to participants in a meaningful way, facilitate human-computer interaction and intra-participant communication, as well as collect a sufficient quantity of useful community-based information. It was also required that the research design provide an effective approach to yield useful information to locate future affordable housing. The following section describes the effectiveness of the research design in achieving these goals.

Simplicity and usefulness were key issues in developing a research design that is suitable for real-world implementation. The research design needed to be simple enough to be accepted by and involve busy participants as well as be capable of collecting a sufficient quantity of community-based information. The research design involved a four hour workshop session followed by a more flexible individual online session lasting several days and finally a two hour group online session. It is thought that the simplicity of the research design as well as the generosity of participants with their

time resulted in extremely favourable results to the study as a whole. This can be seen in the large selection of participant-selected sites examined during spatial analysis and in the valuable content discussed during comment analysis.

The second key issue regarding the research design is its ability to present spatial information to participants in a meaningful way. Although the MapChat tool was largely responsible for the presentation of spatial information, the research design was also very important. For example, the initial workshop session was vital in presenting the concept of spatial information technology to participants, explaining the concept of map data layers, and teaching the use of the MapChat tool for the study. The research design also supported less obvious issues related to the presentation of spatial information. For example, the closeness of each session in terms of time minimized the likelihood that participants would forget about steps or concepts they had learned. As a result, the research design was both important and effective in the transfer of spatial knowledge to participants in the study.

The third key issue regarding the research design was how well it was able to facilitate human-computer interaction. The approach used in the workshop facilitated general aspects of HCI. For example, all users were able to use menus, buttons, tabs and other aspects of the software interface to good effort. Specific software functionality however did cause problems. In particular, the select by freehand polygon tool gave several users trouble, especially due to the slow response speed of the client-server interaction. Few participants were aware that all interactions were running concurrently from a huge server located at the University of Waterloo and that their requests and responses were running over the Internet. As a result certain tasks required not only mouse skills but also patience. The research design could have been more accommodating in this regard by providing more practise time for users and information concerning how the system works.

The second objective of the thesis was to implement the designed approach in a real-world setting with recruited participants. This objective can be broken down into an evaluation of three components including the participant experience, technology performance, and the interaction between participant and technology.

Study participants were vital in the implementation of the study in a real-world setting. Although the majority of the participants belonged to the same local non-profit affordable housing organization, each participant had separate views and a different experience with the study. This experience would have been best captured using participant feedback following the implementation. However, since participants were busy individuals and had already contributed a great deal of time to the study, this information was not collected. Thus, no concrete evidence exists regarding participant perspectives and their true feelings regarding the implementation.

The technology utilized in the study focused on a Web-enabled geospatial tool called MapChat. The software architecture of MapChat functioned to handle the workload during each phase of implementation. During the workshop session MapChat was able to handle relatively well the simultaneous data requests of 10 users and throughout the group online session, there were no problems with synchronous discussion between participants. For the workshop session, the computer lab was equipped with high speed Internet connections and Internet Explorer, and no problems were encountered concerning accessibility. However the individual and group online sessions involved home access by participants using slower Internet connections. As discussed in Section 4.4, this proved to be a challenge for certain users and resulted in limited participation.

The interaction between participants and technology is a key concern in the study. These interactions could be observed during the initial workshop session but not thereafter. Neilsen (1993) explains that the aims of HCI are to understand how people interact with computerized systems, and

to ensure that such systems are ‘good enough to satisfy all the needs and requirements of the users and other potential stakeholders’. Preece, et al. (1994) add that users expect computer systems to be useful for achieving their goals, not only in terms of the appropriateness of the functionality they may provide, but also in terms of how well and easily such functionality can be operated.

During the initial workshop session it was observed that users encountered difficulty in adjusting to the navigation tools. This was observed during the allotted practice time of the session and also well into the identification of sites by participants. Another major usability issue experienced by users involved the drawing tools. In examining the entire set of participant-selected sites collected during the study, it was clear that a considerable number (approximately 20) of out of place shapes and slivers were evident. It is fair to assume that these shapes were the result of usability issues with MapChat. Thus, usability was a problem concerning the participant-technology interaction. It is possible that usability issues would improve significantly with practise, however this is not possible to determine at this time.

The overall appropriateness of the technology could be observed through participant feedback throughout the study. During the workshop session several participants had positive comments regarding their impression of the technology and how it was appropriate for the application. In addition, contained in the comments in Appendix D, there were also positive comments concerning appropriateness of the technology. For example, one participant mentioned: “The potential is huge with so many competing demands on space and the developers wanting to do so much high end construction.”

The third objective of the thesis was to examine the spatial patterns of existing housing and the locations identified in the study to determine locations that are suitable for future affordable housing in Collingwood. According to the results discussed earlier, 93 locations were selected by participants.

These locations were consistent, and, as a result, were converted into participant-selected clusters during spatial analysis. It was illustrated in the study that the spatial patterns of existing housing were somewhat dispersed, meaning that the housing that is in place functions to encourage the creation of mixed neighbourhoods. Participant-selected clusters were compared to existing housing and a number of clusters were eliminated as high potential areas because they were too close to existing housing sites. The remaining dispersed sites were then further refined in accordance with proximity to community features and the goals of the Town of Collingwood as stated in their Official Plan.

It is thought that the final set of sites could be used by the Town of Collingwood. These sites achieved a compromise between a number of diverse community interests including study participants, the town, dispersion and low income households. It could be argued that the needs of low income groups were not presented in the thesis because the study group did not represent low income members of the community. This is considered a constraint of the study. However, if follow-up work is pursued, a high priority issue would be to develop a study group of low income individuals in Collingwood. For the purposes of this study the needs of low income groups were accommodated by proximity to community services. Another use of the final set of sites would be proximity to town-owned lands. These lands can be prioritized in accordance with the most suitable sites selected in the study. During future affordable housing development of town-owned lands this could be a valuable resource.

As discussed in Section 3.6, pre-use assessment of the MapChat tool involved developer observation of participants. This assessment was conducted passively and did not adequately document the tools effectiveness using a structured approach. As a result, the MapChat evaluation was considered a weakness in the study and an area of improvement for future research. Evaluation methods are a common problem in the field of PGIS. Rambaldi and Weiner (2004) state that among

practitioners, researchers and activists, there is the general consensus that PGIS practice is more advanced than the theory behind the applications. Rambaldi et al. (2006) add that there is a need to evaluate the experiences (failures and successes), and develop guidelines and strategies for good practice and for the sound adoption of PGIS. Future research should focus on standardized ways in which to conduct evaluations.

Several evaluation methods are possible for post-use assessment of the MapChat tool following beta version development. This could involve the use of audio or audio-video equipment to record interaction and comments during implementation. Although this method has potential, certain risks do exist including the alteration of natural tendencies of participants and adding extra pressure to participants in conducting their tasks. Another method of evaluation would be to survey or interview participants following implementation of the tool. Although more time consuming, this method would deliver considerable insight into the effectiveness of the tool and could provide valuable information used to guide further development.

A comparison of MapChat to other tools is perhaps best accomplished by examining its range of capabilities. As illustrated in Section 2.9.2 of the thesis, Laurini (2001) describes the range of capabilities that PGIS tools offer. The capabilities include group communication, information management, graphic display, spatial analysis, process models, advanced spatial visualization, decision models and structured group process. MapChat does function to support group communication using its annotation and chat capabilities. It also supports information management as the server contains all spatial and attribute information and is able to automatically collect and organize user input. MapChat supports graphic display, in particular, the display and navigation of digital maps.

MapChat does not support spatial analysis and does not contain capabilities to do basic analytical functions such as proximity, buffering, overlay, data analysis and data mining. In addition, MapChat does not function to support descriptive or simulative models of physical and human spatial processes. The tool deals with static digital maps rather than various types of simulation, virtual reality or multimedia animation. Decision models which utilize decision rules and integrate individual and group derived evaluation criteria such as multi-criteria analysis are possible within the realm of PGIS tools and techniques. At this point, the MapChat tool does not contain decision models, however in the future; an extension called MapChoice will support this functionality. Finally, structured group processes involving facilitated/structured group interaction or brainstorming is a function that is possible using PGIS tools. MapChat supports this functionality as its chat environment facilitates discussion in an organized, structured and potentially facilitated manner. In addition, all group interaction is stored automatically for the purposes of organization and easy reference following the group session.

In terms of building on existing approaches, the research presented in the thesis fits in very well with the necessary research directions of the field of PGIS. As identified by Carver, (2003) PGIS research needs to focus on raising awareness of geographic information-based participation to decision makers, methods of incorporating local knowledge into GIS databases, methods of communicating geographic information to the lay public, and more practical real-world applications of PGIS. Although it is not known if the thesis research raised awareness specifically to decision makers, a significant amount of local affordable housing knowledge was incorporated into a GIS database, a significant amount of geographic information was communicated to the lay public and the study formed a practical real-world application.

The relationship between MapChat and its potential to foster public participation may be gauged using the conceptual framework developed by Arnstein (1969). As illustrated in Table 2.1, the base of the ladder represents manipulation and therapy, which involve little or no opportunity to participate. With successive rungs, such as informing and consultation, there are increased levels of participation. However, often the emphasis is placed on the one-way flow of information with no channel for feedback. Higher up the ladder is placation and then partnership which enables citizens to negotiate with traditional power holders and share decision-making responsibilities through policy boards and planning committees. At the topmost rungs, delegated power and citizen control allow citizens to obtain the majority of decision-making seats, or full managerial power.

In the context of Arnstein's ladder, the MapChat approach is situated at the partnership level. Although the tool is able to inform the public using spatial information contained within the map interface, it is also able to achieve the two-way flow of information using annotation and chat features. In addition MapChat is able to take on an entity of its own (perhaps similar to a committee) which is more powerful than any one citizen and arguably group of citizens. For these reasons the MapChat approach is able to achieve the level of partnership and potentially higher, depending on the extent to which decision makers recognize MapChat as a democratic tool to represent citizen interests.

The ladder provided by Arnstein, 1969 was meant to deal with traditional forms of public participation. Despite adaptations by Weidemann and Femers (1993), and Kingston (1998), the traditional ladder is unable to accommodate new forms of public participation based around information and communication technologies, and the Internet. The e-participation ladder developed by Smyth (2001) accommodates more recent technological developments into the ladder concept. Within the e-participation ladder MapChat has the potential to cover a range of ladder rungs

depending on its implementation. At the lowest level it could function at the third rung of the ladder (online discussion) using the chat interface. Under these conditions the tool would support the two-way flow of information but a disconnect between citizens and decision makers could still result in traditional “non-participation”, as defined by Arnstein (1969). At the highest level of the e-Participation ladder, MapChat has the potential to fit into the highest rung of the e-Participation ladder (online decision support systems). At this level, MapChat would be supporting an extensive two-way flow of information, be absent of communication barriers, and be a key aspect supporting decision making.

The potential role of a tool like MapChat in public consultation strategies is extensive. However, PGIS tools are best used in combination with other more traditional public participation techniques. For a given land use or planning problem, MapChat could first be used to educate the public through the online visualization of spatial information. The education or learning phase could be supported through traditional community workshops. Second, MapChat could act as a forum for online citizen input. This could involve the capability of the tool to utilize spatially-linked comments which are also stored in a database management system. Third, MapChat could be used to build consensus on the particular planning problem. Potentially, consensus could be constructed using collected database content and facilitated discussion within the chat interface of MapChat. Finally, the results of consensus which may involve several scenarios could be presented back to the community using maps that could be accessed online. Following the use of MapChat for public consultation, collected information could be built upon at a public meeting or other traditional meetings. The advantage of a diverse approach using new and traditional methods would perhaps maximize participation, democracy and the usage of different types of information. The future of planning demands a

portfolio of techniques which are able to work together and MapChat fits in very well within the range of existing techniques.

4.6 Summary

Chapter 4 presented the results of participation analysis, spatial analysis, and comment analysis and discussed these results specifically and as they apply to the thesis objectives. Chapter 5 will conclude the thesis by restating the importance of affordable housing in Canada, explaining how thesis objectives have been met, discussing additional contributions of the thesis research, and finally providing recommendations for future research.

Chapter 5
Conclusion

This thesis has explored the issue of affordable housing in Canada. The thesis has presented an approach that seeks to engage concerned citizens to explore not only their views on the issue but also to identify potential housing locations in their communities. The approach uses spatial information technology and the Internet to foster participatory in these different ways. It was applied in a tourism-based location in southwestern Ontario, namely the Town of Collingwood.

First, this chapter reviews the importance of affordable housing in Canada. Second, an explanation is given concerning how the thesis objectives were achieved. Third, additional contributions of the research are identified in the context of locating future affordable housing in Canada. Last, recommendations are provided for future research.

5.1 Affordable Housing in Canada

In Canada about 14% of households spent 30% or more of their budget on shelter costs in 2004 (Luffman, 2006). The scale of this problem is enormous and, as identified in the thesis, the situation is worsening as a result of a number of social trends. At the individual level, affordable housing provides a foundation for obtaining employment, raising children, and building relationships within the community, while at the community level affordable housing affects community welfare, the social fabric, and community cohesion (Murphy and Cunningham, 2003).

In Canada some of the most severe affordable housing shortages occur in tourism-based communities. These towns often provide wonderful natural amenities and employment opportunities, especially in the service industry. However, the cost of accommodation is often overwhelming. This

creates a difficult planning problem in these communities. At the heart of the problem lies the complex issue of integrating diverse community interests while empowering those who wish to express their views on where new affordable housing projects might be best located.

5.2 Thesis Objectives and Affordable Housing

All objectives identified in the thesis were satisfied. The first objective was to define a collaborative, spatially-aware approach to create and assess affordable housing options in Collingwood, Ontario. This objective was achieved by developing a three-phase study approach and employing the functionality of the MapChat participatory software tool. The approach was collaborative because it involved the input and interaction of ten participants from a local non-profit organization in Collingwood. Spatial awareness was achieved as the approach involved a spatial dataset which guided participants and was used for spatial analysis. In total, 93 participant-selected sites were generated and therefore the study was successful in creating a set of affordable housing options. The options were assessed in conjunction with criteria provided by the town and the needs of low-income residents. Thus, all aspects of the first objective were successfully achieved.

The second objective was to implement an approach to generate participatory input using a collaborative software tool in a real-world setting. This objective was achieved by holding three sessions with study participants. The first session was a four hour workshop held on April 30th, 2007 at the Collingwood campus of Georgian College. The second session was held on the Internet over a three day period (May 1-3, 2007) following the workshop in Collingwood. The third and final session was similarly Internet-based and lasted two hours on each of May 6 and May 7, 2007. Hence, the designed approach was successfully implemented in a real-world setting.

The third and final thesis objective was to examine the spatial patterns of existing affordable housing and the locations generated in the study to determine sites that participants consider to be most suitable for future affordable housing development in Collingwood. This thesis objective was achieved by applying spatial analysis operations to the final set of participant-selected potential affordable housing clusters. First, the proximity of participant-selected clusters to existing affordable housing sites was evaluated. It was found that three clusters were inappropriate as they were within 500 metres of existing sites and were therefore not considered suitable. The remaining sites were then evaluated with regard to their proximity to several other features. Participant-selected clusters that were located within medium and high density zones, were within 100 metres of the bus route, and were within 1 kilometre of childcare, schools, and supermarkets were considered to be the most suitable for affordable housing. Therefore, the third objective of the thesis was met, as the most suitable sites were determined for future affordable housing development.

Beyond satisfying the thesis objectives, the research in the thesis has made a number of additional contributions to the study of affordable housing in Canada. The approach outlined in this thesis provides a proof of concept in the use of Internet-based collaborative geospatial software that can be applied to any town in Canada, including tourism-based towns. Although the approach involved a modest study design, it was able to offer a number of potential advances in planning the locations of future affordable housing. These include information generation and management, participation, and empowerment.

Perhaps the most important aspect of the approach used in the thesis was its information generation and management capabilities. In the study, each participant completed the task of selecting and annotating potential housing sites. To do this, participants reviewed map-based information, interacted with the MapChat tool, and used their individual knowledge to select locations as well as

annotate their choices. This process generated a significant amount of community-based information. During this process every aspect of site selection, annotation, and commenting was recorded and managed automatically within the system. In this way, the approach was effective both in the generation and management of information.

Participation formed an important part of the research conducted in the thesis. The approach illustrated that it was capable of supporting widespread participation. Ten individuals participated in the workshop, while lower levels of participation were encountered in the Internet-based sessions. However, with certain improvements (discussed in Section 5.3), the potential for the approach to generate widespread participation is high.

Although the thesis is somewhat limited in terms of the number and diversity of participants, the approach has the ability to empower citizens. If participants are able to access an Internet connection and take the time to learn the use of the tool, they are able to participate in the process. The thesis research showed that relatively inexperienced computer users were capable of using the system and communicating their opinions. In addition, the approach maintained the anonymity of each user throughout the study.

5.3 Recommendations for Future Research

The thesis can be considered successful relative to its stated objectives and in contributing to the broader issue of housing affordability in Canada and elsewhere. However, clearly there are grounds for improving the approach, the design and functionality of the MapChat tool, and the methods of analysis that were employed. These issues should form the basis for extensions of the research reported in this thesis. These extensions are discussed in the following and final section.

The approach used in the thesis was effective. However, possible improvements do exist. A longer study period would have added considerable strength to the approach used. In particular, this would have allowed participants more time to learn and practise with the MapChat tool. In the study approximately 2 hours was allotted for learning and practising. Future work should dedicate at least twice this amount to obtain a higher level of proficiency with the tool prior to using it for site selection. Another improvement to the approach used would be to develop a protocol that encouraged a higher level of commitment from participants. Although commitment was quite good in this study, there is definitely room for improvement. A longer study period and further commitment from participants would allow for increased facilitator-participant interaction (face-to-face) and more participant-participant interaction (on-line) with the use of the tool.

The MapChat tool has a number of positive attributes. It is easily accessed through a standard Web browser, the interface is not complex and it automatically stores information as it is generated by participants. Nevertheless, there are improvements that can be made. Faster communication between client computers and the MapChat server in requesting data would be a major improvement. In this study, it was noted that participants encountered usability problems because of the data request delay. Another improvement would be the addition of an identify tool within the interface. This would give participants additional information on selected parcels such as lot size, number of buildings, building height, year of construction, land owner and even photographs of the site. Although an identify tool would make MapChat slightly more complex to use, the information content would allow for more informed participant selections.

The methods of analysis used in the study included participation, spatial and comment analysis. It is possible that a different set of spatial analysis techniques could be used beyond those described in Chapter 4. For the spatial analysis in the study, clusters were formed by the researcher and a number

of proximity and overlay analyses were carried out. Depending on the number of participant-selected sites collected, the GIS capabilities available, and the data sets used, other options are available for spatial analysis. Possible improvements here could include the use of spatial statistics such as spatial autocorrelation to determine spatial co-variance between participant-selected clusters, network analysis to determine shortest path from selected sites to community facilities, or 3D visualization to generate more realistic scenes of suitable locations within the community. Regardless, it should remain a high priority to maintain the integrity of the original participant-selected sites and to integrate only high quality data from reputable sources.

The research presented in the thesis strongly supports the research directions proposed by Carver (2003). In particular, the research incorporates local knowledge into GIS databases, utilizing the annotation capabilities of MapChat to embed local knowledge on spatial features. The research communicates geographic information to the lay public, namely members of SCATEH using the MapChat interface. Lastly and perhaps most importantly, the research in this thesis provides a much needed practical and real-world application of PGIS. Carver (2003) mentions that the reasons for the lack of real-world PGIS applications are not clear but are likely to include political difficulties, lack of resources and expertise, and the fact that the public at large are, perhaps, just not ready for it yet. During the research numerous difficulties were overcome such as contacting and organizing a study group, finding a workshop venue, and working out software-related issues. Perhaps getting past these difficulties to present a useful real-world application is the most admirable outcome of the thesis research.

The research provided in this thesis is part of an important technological niche which may provide solutions to planning problems in the future. As shown in the thesis, spatial information technology shows high potential in the planning of affordable housing because it is able to facilitate participation,

information exchange and empowerment through the use of the Internet. In the future, as cities and attractive communities in Canada continue to swell, there will be a growing need for methods to address difficult planning problems such as affordable housing development. New and innovative technological approaches such as the one described in this thesis may provide a means to manage growth and perhaps contribute to a more sustainable future.

Appendix A

Protocol Used to Guide Participants in Selecting Sites

1) Indicate on the map the necessary parcels or areas required to meet the need for affordable housing in Collingwood.

2) In your comments be as descriptive and expressive as possible and indicate what factors were important for each site.

3) Consider the following in making selections:

- Number of units needed
- Number of locations needed
- Size of locations needed
- Proximity to Services
- Proximity to Employment
- Clustered vs. Dispersed
- Type of Occupants
- Vacant or underutilized land
- Type of units needed
- Areas that may be converted
- NIMBY (Not In My Back Yard)
- Neighbourhood Characteristics

Appendix B

Area of Selected Affordable Housing Sites

User Name	Area (Sq M)	Area (Acres)
scateh_1	16485.83	4.07
scateh_1	24431.82	6.04
scateh_9	1632.97	0.40
scateh_1	2992.89	0.74
scateh_2	14028.90	3.47
scateh_1	25395.24	6.28
scateh_3	4161.76	1.03
scateh_3	14028.90	3.47
scateh_2	1877.07	0.46
scateh_9	1632.97	0.40
scateh_11	3545.34	0.88
scateh_4	16622.71	4.11
scateh_9	1632.97	0.40
scateh_4	2014.57	0.50
scateh_9	3924.33	0.97
scateh_4	534410.74	132.06
scateh_11	21429.53	5.30
scateh_11	27070.23	6.69
scateh_11	2255.01	0.56
scateh_3	2014.80	0.50
scateh_3	2785.37	0.69
scateh_3	4161.76	1.03
scateh_3	16199.12	4.00
scateh_3	15603.36	3.86
scateh_3	619.24	0.15
scateh_8	4085.60	1.01
scateh_8	1811.39	0.45
scateh_8	1457.03	0.36
scateh_8	1414.84	0.35
scateh_8	2447.57	0.60
scateh_8	1533.06	0.38
scateh_8	4085.60	1.01
scateh_8	623.65	0.15
scateh_8	3053.97	0.75
scateh_7	58015.86	14.34
scateh_7	4161.76	1.03
scateh_7	3299.99	0.82
scateh_8	2980.00	0.74
scateh_8	617.58	0.15
scateh_8	1533.06	0.38
scateh_8	1536.26	0.38
scateh_8	623.65	0.15
scateh_8	624.11	0.15
scateh_3	746.11	0.18

scateh_3	745.76	0.18
scateh_3	746.00	0.18
scateh_3	1022.34	0.25
scateh_3	619.24	0.15
scateh_3	619.30	0.15
scateh_3	464.58	0.11
scateh_3	703.76	0.17
scateh_3	689.78	0.17
scateh_8	2980.00	0.74
scateh_8	1120.64	0.28
scateh_8	1019.02	0.25
scateh_8	1024.01	0.25
scateh_8	726.03	0.18
scateh_8	551.63	0.14
scateh_8	1536.26	0.38
scateh_8	1022.05	0.25
scateh_8	1018.29	0.25
scateh_3	2057.11	0.51
scateh_3	4050.85	1.00
scateh_1	842.22	0.21
scateh_1	868.80	0.21
scateh_8	2785.37	0.69
scateh_1	924.79	0.23
scateh_1	1017.34	0.25
scateh_2	14028.90	3.47
scateh_7	4161.76	1.03
scateh_7	3299.99	0.82
scateh_7	333.94	0.08
scateh_7	541.33	0.13
scateh_7	560.57	0.14
scateh_7	562.95	0.14
scateh_7	330.02	0.08
scateh_7	1081.64	0.27
scateh_9	1632.97	0.40
scateh_7	4161.76	1.03
scateh_2	14028.90	3.47
scateh_11	3592.89	0.89
scateh_9	1632.97	0.40
scateh_11	2.06	0.00
scateh_7	25395.24	6.28
scateh_7	13643.58	3.37
scateh_7	13959.76	3.45
scateh_7	1959.65	0.48
scateh_7	25395.24	6.28
scateh_7	13959.76	3.45
scateh_7	13643.58	3.37
scateh_7	1959.65	0.48
scateh_4	2014.57	0.50
scateh_3	145137.70	35.86
Total Area	**1191785.11**	**294.50**

Appendix C

Comments Submitted during Workshop and Individual Online Session

#	Subject	Comment	M-D-T	Relevance	Detail
1	scateh_1	This parcel has been vacant for so long we should look at it.	04-30-13:43	M	L
2	scateh_8	explain this area	04-30-13:45	L	L
3	scateh_9	would like to know if this parcel could accommodate affordable housing.	04-30-13:47	L	L
4	scateh_1	The west side of this park has been zoned multi-res for the last 25 years, but was rezoned by the town at the request of neighbours who opposed its being developed as affordable housing.	04-30-13:49	H	H
5	scateh_1	This is the section that was to accommodate 54 units under the Canada-Ontario Affordable Housing agreement. It was rezoned from multi-res to parkland at the request of neighbours.	04-30-13:51	H	H
6	scateh_2	Who owns this lot?	04-30-13:52	H	L
7	scateh_2	This looks promising for affordable housing.	04-30-13:56	H	L
8	scateh_5	Note there is no "recommended" affordable housing area in the centrre of town - despite the fact the town's only criteria for affordable housing are "medium to high density" and "close to services"	04-30-13:59	M	M
9	scateh_1	This parcel lies close to schools, the hospital, Collingwood Trails System and bus routes. High-density townhouse developments (assisted home ownership or rental units) directed to young families or seniors would be a good mix here.	04-30-14:05	H	M
10	scateh_3	This looks like it is in the town's official plan for multi units and affordable housing. It is close to the schools and to town and shopping. It has been left undeveloped for many years since the surrounding area has been developed. It is for sale. I am not sure of the zoning or density.	04-30-14:05	H	H
11	scateh_8	Remove forest land provided it is municipal land.	04-30-14:07	L	L
12	scateh_7	this entire area at the east end of the municipal entity, i.e. Collingwood, has no sewer system and is therefore (I would guess), unavailable for higher density housing regardless of the amount of land available AND its relatively lower cost because it is not "... a good address."	04-30-14:07	M	M
13	scateh_8	50 townhouse units needed on 5 acres for service employees serving Collingwood and Blue Mountain area. Bus route to be expanded.	04-30-14:09	M	M
14	scateh_2	This lot is close to small affordable housing units and is undeveloped. Who owns it?	04-30-14:11	H	L
15	scateh_8	Let me have your comments.	04-30-14:13	L	L
16	scateh_3	Looking at this parcel it seems like the location and Official plan designation is right. Maybe we could find out more about this site.	04-30-14:15	H	L
17	scateh_9	would also like to know from comments, about the proximity to a n intersection.	04-30-14:17	M	M
18	scateh_9	would like to know about traffic flows on the adjacent roads.	04-30-14:20	M	M
19	scateh_9	would also like to know about the present density of this area.	04-30-14:25	M	M
20	scateh_9	does this area have adequate access ability for emergency services.	04-30-14:27	M	M
21	scateh_9	is parking permitted on the area roads.	04-30-14:29	M	M
22	scateh_9	if the area is developed would "swing" parking be permitted for visitors.	04-30-14:31	M	M
23	scateh_9	are any traffic controls being considered for this area or its neighbours?	04-30-14:34	M	M
24	scateh_11	The markings for this property are not very accurate but this is	04-30-14:35	H	H

		the south end of the soccer field that became so controversial and the vacant land beside it that is privately owned. If this privately owned parcel could be acquired affordably there would be a fair amount of land available to develop. The youth soccer field could be reconfigured to run East to West on Ontario Street with the elimination of the tennis court that is no longer used and repositioning the playground to located behind			
25	scateh_4	There are a number of existing dwellings that could be upgraded/renovated to provide a mix of rent geared to income and market value rental/purchase (freehold/condo) dwelling units.	04-30-14:39	H	H
26	scateh_5	Affordable housing should be in the situated in the 'core' area of town. Different types of housing are needed for people with different needs. Affordable housing should be spread throughout the community, in 3 to 6 unit groups to avoid concentrating too much of it in any one particular area. This suggestion has nothing at all to do with protecting more affluent residents; rather, this will provide the less affluent an opportunity to live in better enviornments. Don't create ghettos!	04-30-14:45	M	H
27	scateh_11	Just for general knowledge there are a few affordable housing sites that are not identified on the map or are identified in the wrong location. 250 Erie Street is marked on the corner beside Sunset Manor. In fact it is directly across from the ball diamond. The property on the corner of Albert and Ontario Street is actually on the North west corner rather than the east corner, there is one additional building at the end of Napier Street close to the Pretty River Parkway. There is no access from	04-30-14:46	H	H
28	scateh_4	Affordable housing should be mixed throughout the community. There are different customers for affordable housing with differing needs for facilities and location. The area, nor the people living in affordable housing units, shouldn't be stigmatized by the location of the units, it shouldn't be apparent to passersby that a property has affordable housing units.	04-30-14:48	M	H
29	scateh_9	the school bus route may be a problem how would you feel about this.	04-30-14:49	L	L
30	scateh_3	This official plan view of the downtown zone seems to show no opportunity for medium or high density development. The 2005 provincial policy statement on land use planning states that downtown areas must densify instead of sprawling over valuable farmland that requires more distant and more expensive servicing as well as increased automobile dependance. Discussions in "the new urbanism" also support density over sprawl. People want to be where the action is and where the ammenities are conveniently located. As well, I will be using the term smart housing over affordable housing. It is politically more saleable and conveys the ideas that are important to me. Well built with economic, environmental and social impacts considered and balanced.	04-30-14:57	M	H
31	scateh_4	I believe this property is already owned by the municipality which would make it an easier candidate for conversion to a variety of market value housing and municipal affordable housing units. This would be a more appropriate location for higher density/height development while respecting the heritage character of the local community.	04-30-14:59	H	H
32	scateh_3	Smart housing minimizes the ongoing utility and maintenance costs. It is value driven. It is socially inclusive and recogized that all income, age, wealth, able and disabled need places to live.	04-30-15:00	M	M
33	scateh_4	There should be a university here!	04-30-15:02	L	L
34	scateh_4	There should be a move away from this type of development,	04-30-15:05	M	M

		instead a greater focus on a more compact urban form and a return to the town grid.			
35	scateh_9	if the town proceeds with a road in this area would like to know how you feel about affordable housing	04-30-15:06	M	M
36	scateh_4	There should be some residential development near the commerical area so users can walk to the stores and provide some "life" in the area after hours. Connection of affordable housing units (and really any residential development)to walking trails and transit opportunties is critical.	04-30-15:10	M	H
37	scateh_11	Here is a parcel of undeveloped land that I believe is privately owned but I don't know how it is zoned. It does fit the citeria of being close to schools and bus routes.	05-01-11:31	H	H
38	scateh_11	This parcel of land is currently for sale and has easy access to services and bus routes.	05-01-11:36	H	M
39	scateh_11	This parcel of land is currently for sale, privately owned. The parcel beside it is sold but nothing has been developed there either. This is zoned multi-residential and was in fact identified for an 80 unit non-profit prior to the Harris government being elected. The funding for that project which was being sponsored by the Labour Council was cancelled by the Harris government.	05-01-11:48	H	H
40	scateh_3	This parcel here is listed with Brad Williams 444 46xx. It is on High Street and says it can accommodate a 15 unit walk up scenario. Beside it is an old sign for westview terrace listed with Bob Allen 445 43xx. The location is good for shopping, work in the mall area, greenspace, and some schools.	05-03-21:52	H	H
41	scateh_3	This is 400 2nd Street the old King George School owned and operated by rad whitehead. It has recently had a new roof put on it and looks like it could accomodate 8 more unit or so. Zoning may be holding this up from happening.	05-03-21:55	H	H
42	scateh_3	This is listed with Alex Hunter Prudential 446 30xx. It is right across from the High School and a short walk downtown. The entrance to an affluent subdivision probably dictates that this building would have to be an aesthetic "value statement" on the entrance to their neighbourhood.	05-03-21:59	H	H
43	scateh_3	I think this is the site of "the Trails" with studios from $127 K. Perhaps an early purchase agreement for a floor in the building with units to be finished by us would yield a great price for us and early construction start for the developer (meeting presales earlier) this has been done in the US to good success as the concept creates a mixed income building and a diverse neighbourhood.	05-03-22:03	H	H
44	scateh_3	this area has a burned out house in it. The lot is a big lot. Perhaps we could do something here	05-03-22:07	H	M

Appendix D

Comments Submitted During the Online Group Session

#	Subject	Comment	M-D-T	Relevance	Detail	Discuss
45	noble	Small unit size is a very interesting idea. Although the downtown area is considered a community improvement area, the official plan mentions things like maintaining a safe, convenient and attractive environment downtown. Small units may have high potential in blending into the downtown and improving it by increasing walking traffic rather than vehicle traffic.	2007-05-06 20:24	H	M	Y
46	noble	Just a reminder to click on blue dots to reply to comments and click on the small yellow pencil to zoom to annotated map features!	2007-05-06 20:26	M	M	N
47	noble	Also, for a clear view of the map you can turn other users drawings off in the legend if you wish.	2007-05-06 20:36	M	M	N
48	scateh_5	I disagree. I know two people who have moved into this area because it was relatively inexpensive and very 'cosmopolitan'- a comfortable new neighbourhood. This is exactly where we need a half dozen affordable homes for low income families focused on improving their lives - their environment is often very important in their decision making, and therefore, their futures.	2007-05-06 20:43	H	H	Y
49	scateh_7	what is the price for the lot at the corner of hurontario and lockhart rd?	2007-05-07 18:52	H	M	Y
50	scateh_7	this is hume street between minnesota and peel; i believe the trails is going up on high street between 6th and campbell. maybe this has been dealt with further down in the chat. this street is all built up with houses and businesses if i am reading the map correctly.	2007-05-07 18:57	H	M	Y
51	scateh_7	I am finding this interesting but confusing. it would help me if people identified the site to which they are referring in words as well as marking it on the map.	2007-05-07 19:00	L	L	N
52	noble	This is a good idea scateh_7.	2007-05-07 19:03	L	L	Y
53	noble	There appears to be a few lots for sale on mls for around 45-50K. Here is the link: http://www.mls.ca/PropertyResults.aspx?Mode=0&Page=1&vs=1&rlt=&cp=&pt=0&mp=0-0-0&mrt=-1-0-0&Beds=0-0&Baths=0-0&f=&ft=all&o=A&of=1&ps=10&ptgid=1&aid=1261&MapURL=%3fAreaID%3d993	2007-05-07 19:09	H	H	Y
54	gbhall	Hi user9, user11, and user7 - this is Brent. I was just checking in to see who was on line. Remember that Brad is there to provide help for you to chat with each other about the sites and comments that have been added to date	2007-05-07 19:22	L	L	N
55	gbhall	I am just checking in and checking out again soon after I read the comments over	2007-05-07 19:22	L	L	N
56	noble	Thanks for your input Brent!	2007-05-07 19:24	L	L	Y
57	gbhall	No problem - I hope that scateh_7, 9 and 11 generate a bit of chat with each other..... and with you of course! Have fun people.	2007-05-07 19:31	L	L	Y
58	scateh_7	lots in the town of collingwood for 40 - 50k??? i am amazed as a burnt out house on st. marie or robinson st., sold in a couple of days for 80k. several people have remarked on lots for sale, giving the realtors' names. would it be an idea to check these with the local listing book as it is easy to check by street address without going through realtors.	2007-05-07 19:32	H	M	Y
59	scateh_11	Trevor Houghton from the town planning office clarified for us that the vacant property on the parkway almost across	2007-05-07 19:33	H	H	Y

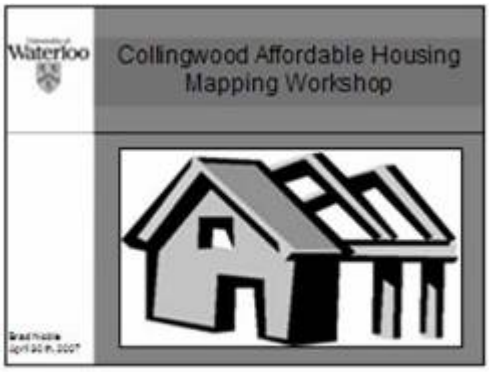
		from Georgian College actually belongs to the town but only a very small piece of it on the north west corner could possibly be useable because it is a drainage area.				
60	scateh_11	Actually this parcel is now under development. At this point there are 12 rental townhouses being developed with future plans to develop a low rise condo complex. However the current townhouse development for @ 1200 sq ' nits are for rent for $3,500 a month utilities and 2 of them are already rented!	2007-05-07 19:38	H	H	Y
61	scateh_7	I just checked on of the lots at 44,9000. development charges are in excess of $12k and the zoning for full time residential is in the works. the other lower cost lots seem to be unserviced and all appear to be single dwelling.	2007-05-07 19:39	H	H	N
62	noble	This is a good idea. The MLS site often seems unclear regarding location.	2007-05-07 19:41	M	L	Y
63	scateh_7	interesting pricing as it goes from 69,9 to 119, to 149 (2 lots), 189, 199, 249 and all the rest are above that.	2007-05-07 19:42	H	H	N
64	noble	I noticed that huge jump as well.	2007-05-07 19:42	H	L	Y
65	noble	after 69K that is.	2007-05-07 19:44	L	L	Y
66	scateh_11	I believe you are making reference to the property that is known as Riverside is you are looiking at Peel and Minesotta area. This would be an excellent location and at one point one parcel was designated for an Options for Homes affordable ownership project. However the parcels that are currently listed for sale on MLS are $4.3 million for 6,3 acres and $4.7 million for 6.7 acres rendering them totally unaffordable.	2007-05-07 19:44	H	H	Y
67	scateh_7	can anyone tell me where the burnt out house is located? I agree with the comments about not creating ghettoes however, for affordability, given the land costs, i think we need to be considering multi-family units. development charges as well as permits add considerably to the land costs and are not guaranteed. a septic system which requires a permit and is specified for several lots, is a MAJOR expense on top of building a dwelling.	2007-05-07 19:45	H	M	N
68	noble	According to the Map the burned out house location is half way between napier and peel, on hume street.	2007-05-07 19:49	H	H	Y
69	noble	if you can zoom to that area there should be an "i" that you can click on at that location.	2007-05-07 19:51	H	M	Y
70	scateh_11	The burned out house is right on Hume Street between Peel and Napier Street on the south side of the street. The lot is privately owned by a man that runs his own painting busines. His name escapes me at the moment. I'm not sure how large the lots or what the zoning is but for a small complex it might work if the owner is interested in selling at a reasonable price.	2007-05-07 19:51	H	H	Y
71	noble	sorry for repeating you scateh_11!	2007-05-07 19:55	L	L	Y
72	scateh_7	no problem, thanks for the clarification. what size is the lot, approximately. I cannot recall seeing the site which is odd as i drive and bike along hume.	2007-05-07 19:56	M	M	Y
73	noble	the lot width appears to be 29m, and the length 49.5m.	2007-05-07 19:59	H	H	Y
74	gbhall	Hi Scateh_5..... welcome to what seems like a pretty lively discussion	2007-05-07 20:03	L	L	N
75	scateh_7	i doubt that would be sufficient for a small complex would it? a standard town lot is 66 x 165 and some houses are half that frontage	2007-05-07 20:04	H	H	Y
76	scateh_11	What lots are you referencing for those prices. Is it lots in Riverside?	2007-05-07 20:05	M	M	Y
77	scateh_7	a duplex might get approved. i guess i am thinking in terms of larger parcels as we need more than a couple of houses although i realize that any additions would be an improvment. i can't imagine any land owner being willing to sell at a reasonable price as unreasonable is the norm!	2007-05-07 20:06	H	M	N

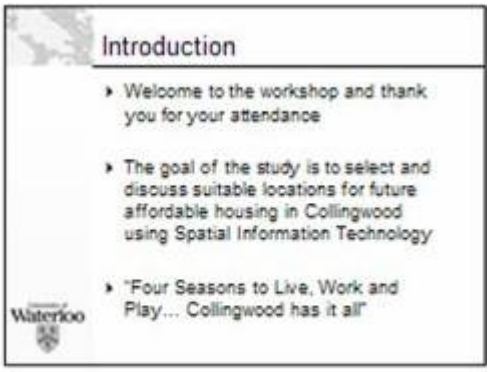
78	scateh_7	i see that there is a huge piece marked on the south side of Poplar Side Road. That is Clearview township, not Collingwood; it's farms and a pet hotel is going in there. see how we take care of essentials!	2007-05-07 20:09	H	H	N
79	scateh_7	sorry, i seem to be hogging.	2007-05-07 20:10	L	L	N
80	noble	oh no problem at all	2007-05-07 20:10	L	L	Y
81	noble	the more banter the better	2007-05-07 20:10	L	L	Y
82	noble	scateh_11 are you still here?	2007-05-07 20:11	L	L	N
83	noble	Some users may be navigating through the maps which is great as well.	2007-05-07 20:12	L	L	Y
84	scateh_11	Sorry I have to sign of but at his point what I am seeing is a very limted number of locations that have any potential. One that I identifed at the end of Cameron Street that would have been ideal just sole for $700,000 but was large enough to do a good development. The lots on High behind Mountainview school have some potential and there is a small parcel between Suncset Manor and 250 Erie Street that belongs to the County of Simcoe but there is a higher density of affordable housing in that ar	2007-05-07 20:13	H	H	N
85	scateh_5	This concept is great. My accessability to effective communication is limited - probably because of the 'antiquity' of my computer - I get comments on about half of the "blue dots" (and none of them turn red) and every action takes 'forever'. Nonetheless, I support the program and the process 110% - we need this kind of ability to communicate on these important issues.	2007-05-07 20:14	L	L	N
86	noble	Thanks for your input scateh_11. Perhaps these locations can be examined more closely.	2007-05-07 20:16	L	L	Y
87	noble	scateh_7 are you still on here?	2007-05-07 20:19	L	L	N
88	scateh_7	yes, but need to sign off as well. my night to make dinner. brad and brent, di dyou get my memo about the town owned lands map that i will be getting tomorrow? I sent everyone a memo about an hour before this session started.	2007-05-07 20:21	M	L	Y
89	noble	just got it a few minutes ago.	2007-05-07 20:22	L	L	Y
90	noble	good work. Will it be arriving electronically?	2007-05-07 20:22	L	L	Y
91	gbhall	I didn't get it - but if it came to Brad I will.....	2007-05-07 20:24	L	L	Y
92	gbhall	We can add that perhaps as an additional layer for you people to browse through at your own leisure	2007-05-07 20:25	M	L	Y
93	noble	that is a great idea.	2007-05-07 20:25	L	L	Y
94	scateh_7	i asked for a hard copy and an electronic one. shall collect the hard copy tomorrow and at that time, repeat the request for an electronic one. i think it will add considerably to the value of our discussions. not that municipal ownership means the land is available but at least we will not be dealing with privately owned lands. are there any plans to expand this sytem to the georgian triangle???	2007-05-07 20:29	M	M	Y
95	gbhall	Yes, but ask for an electronic copy in 'shape file' format - that way we can add it directly to the database	2007-05-07 20:30	M	M	Y
96	noble	I think the tool can definitely be expanded but I may have to pass off future plan questions to Brent.	2007-05-07 20:31	L	L	Y
97	gbhall	I think there will be some expansion to include other users - do you feel overall that this is a useful form of dialoguing with each other?	2007-05-07 20:31	L	L	Y
98	noble	The concepts and technology are all the same but for a larger geographic area. This just means that the dataset would be need to be expanded.	2007-05-07 20:33	L	L	Y
99	scateh_1	Hi Brad and Brent. I was unable to log on last night from home and have just logged on from the Academy where I teach part time	2007-05-07 20:47	L	L	N
100	scateh_1	How has the live discussion been going ?	2007-05-07 20:47	L	L	N
101	noble	oh great scateh_1	2007-05-07 20:47	L	L	Y
102	noble	the discussion has been going well.	2007-05-07 20:47	L	L	Y

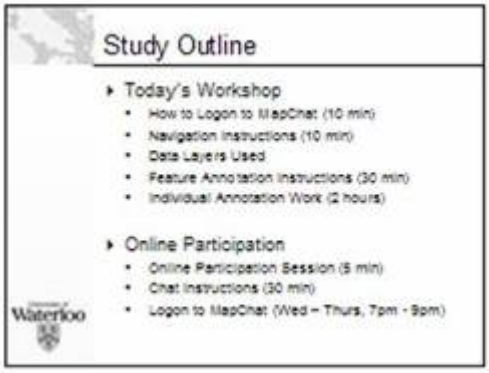
103	scateh_1	I kept getting a fatalerror message from home and am happy to be on here now	2007-05-07 20:47	L	L	N
104	noble	great to have you.	2007-05-07 20:48	L	L	Y
105	scateh_1	I have identified a property by clicking on its comment. How do you know which property I am talking about. How can I identify it for you ?	2007-05-07 20:49	M	L	N
106	scateh_1	Sorry had a meeting tonight and left my booklet at home...	2007-05-07 20:49	L	L	N
107	noble	no problem.	2007-05-07 20:50	L	L	Y
108	noble	well if you direct me to the original comment on that feature, I can click on the pencil and it will zoom to that feature.	2007-05-07 20:50	M	L	Y
109	scateh_1	If I wanted to discuss this property that I have the comment (some one else's) how do you know which one OK	2007-05-07 20:50	M	L	N
110	scateh_1	SCATEH_11: This parcel of land is currently for sale and has easy access to services and bus routes.	2007-05-07 20:52	H	M	N
111	noble	OR you can select the parcel again and make a comment	2007-05-07 20:52	L	L	Y
112	scateh_1	I have copied the comment and pasted it here.	2007-05-07 20:53	L	L	N
113	noble	Got it. I have linked it to this comment as well.	2007-05-07 20:54	L	L	N
114	noble	Now we can both click on the pencil in the last comment to zoom to it.	2007-05-07 20:55	L	L	N
115	noble	It looks like a huge piece of land.	2007-05-07 20:57	M	L	Y
116	scateh_1	That is awesome Brad	2007-05-07 20:58	L	L	N
117	noble	As indicated by scateh_11 this lot still has potential. Not sure about the price for something like this though...	2007-05-07 21:00	M	L	Y
118	scateh_1	So I can put a blue dot on a lot, then can others see the lot with the blue dot -I tried ot put a pencil there but got a blue dot instead.	2007-05-07 21:00	L	L	N
119	scateh_1	The potential is huge with so many competing demands on space and the developers wanting to do so much high end construction.	2007-05-07 21:01	M	L	N
120	noble	Yes, I just clicked on the pencil in your comment and it zoomed me to existing affordable housing units.	2007-05-07 21:02	L	L	Y
121	noble	You're getting the hang of it.	2007-05-07 21:02	L	L	Y
122	noble	all you need to do is select a feature in the map and then type a comment.	2007-05-07 21:02	L	L	Y
123	scateh_1	We really appreciate what you are doing for us here Brad. I will read up on my manual and get at this again.	2007-05-07 21:03	L	L	Y
124	noble	then it is linked and a pencil will appear beside the comment.	2007-05-07 21:03	L	L	Y
125	noble	Oh ya, I'll bet that vacant lot is in VERY high demand.	2007-05-07 21:03	M	L	Y
126	noble	No problem, scateh_1.	2007-05-07 21:10	L	L	Y
127	scateh_1	I should let you go Brad. I just wanted to make sure I had a chance to try the system in a chat conference mode.	2007-05-07 21:12	L	L	Y
128	scateh_1	I will have to set up here on time for the next time we do this.	2007-05-07 21:12	L	L	Y
129	noble	Thanks for your input, greatly appreciated!	2007-05-07 21:12	L	L	Y
130	scateh_1	I will read the comments in the chat that I have missed if I can ... Will they still be here tomorrow... when I am back at this higher speed location?	2007-05-07 21:13	L	L	Y
131	noble	Yes, this will be available tomorrow. Feel free to reply to comments as well.	2007-05-07 21:14	L	L	Y
132	scateh_1	I have Bell and my ISP working on why my download speed is so variable at home. Was never a problem until a few months ago when skype started to kick out after a few minutes chat.	2007-05-07 21:14	L	L	Y
133	scateh_1	Great. thanks Brad. I am going to sign off for now.	2007-05-07 21:15	L	L	Y
134	noble	Thanks and have a great night!!	2007-05-07 21:15	L	L	Y
135	scateh_1	This is great!	2007-05-07 21:15	L	L	Y

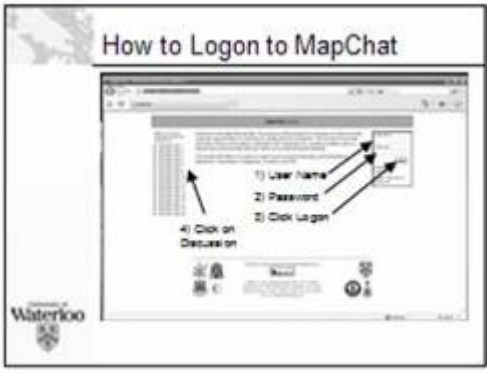
Appendix E

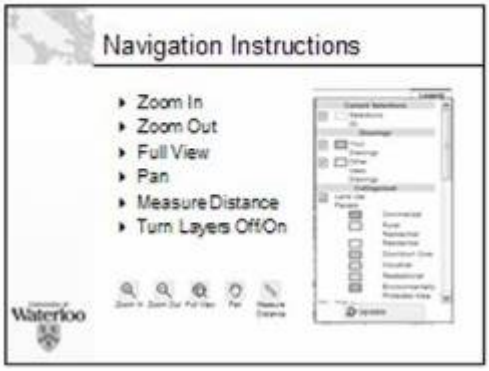
Handout Given to Study Participants During Workshop Session

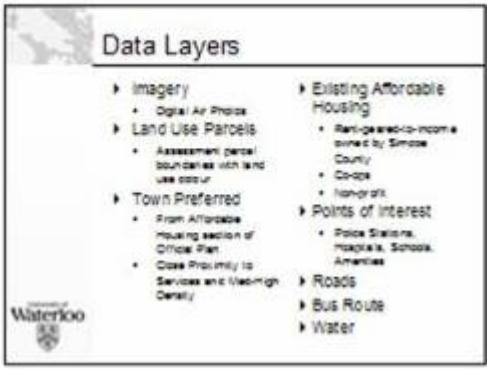












Feature Annotation (Select)

Feature Annotation (Draw)

Individual Annotations (2 Hours)

- Indicate on the map the necessary parcels or areas required to meet the need for affordable housing in Collingwood
- In your comments be as descriptive and expressive as possible and indicate what factors were important for each site
- Consider:
  - Number of units needed
  - Number of locations needed
  - Size of locations needed
  - Proximity to Services
  - Proximity to Employment
  - Clustered vs. Dispersed
  - Type of Occupants
  - Vacant or underutilized land
  - Type of units needed
  - Areas that may be converted
  - NIMBY (Not In My Back Yard)
  - Neighborhood Characteristics

Online Participation Session

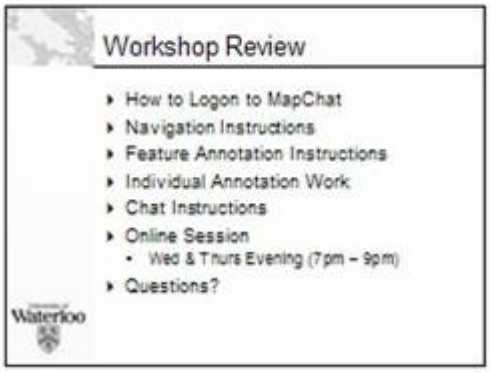
- Wednesday May 2nd 7pm – 9pm
  Thursday May 3rd 7pm – 9pm
- Will combine locations and comments from all workshop participants (anonymous) into one discussion
- View results, reply, chat and discuss
- Logon to Mapchat
  https://gala.uwaterloo.ca/mapchat/
  (Type into Internet browser)

Chat Features (Reply)

- Reply to a message
  - Click blue dot of comment, it turns red
  - Enter text in box at bottom of chat window
  - Click Reply
  - Can expand and collapse thread

Chat Features (Comment-Feature Links)

- View Comment-Feature Links
  - Click on pencil icon of any comment
  - Feature is shown in Map View


Workshop Review
How to Logon to MapChat
Navigation Instructions
Feature Annotation Instructions
Individual Annotation Work
Chat Instructions
Online Session
Wed & Thurs Evening (7pm – 9pm)
Questions?
Waterloo

Appendix F

Notification of Full Ethics Clearance

UNIVERSITY OF WATERLOO

OFFICE OF RESEARCH ETHICS

Notification of Full Ethics Clearance of Application to Conduct Research with Human Participants

Faculty Supervisor: Brent Hall — **Department:** Geography

Student Investigator: Brad Noble — **Department:** Geography

ORE File #: 13875

Project Title: Assessment of Affordable Housing Options using Collaborative Mapping, Collingwood, Ontario

This certificate provides confirmation that the additional information/revised materials requested for the above project have been reviewed and are considered acceptable in accordance with the University of Waterloo's Guidelines for Research with Human Participants and the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans. Thus, the provisional ethics clearance status has been removed and the project now has received full ethics clearance. This clearance is valid for a period of ***four years*** *from the date shown below and is subject to an* ***annual ethics review process*** *(see Note 2). A new application must be submitted for on-going projects continuing beyond four years.*

Note 1*: This project must be conducted in accordance with the description in the application and revised materials for which full ethics clearance has been granted. All subsequent modifications to the application must be submitted for prior ethics review using ORE Form 104 and must not be intiated until notification of ethics clearance has been received.*

Note 2*: All ongoing research projects must undergo annual ethics review. ORE Form 105 is used for this purpose and must be submitted by the Faculty Investigator/Supervisor (FI/FS) when requested by the ORE. Researchers must submit a Form 105 at the conclusion of the project if it continues for less than a year.*

Note 3*: FIs and FSs also are reminded that they must immediately report to the ORE (using ORE Form 106) any events related to the procedures used that adversely affected the participants and the steps taken to deal with these.*

ADDITIONAL COMMENTS:

[ ] No additional comments

[✓] Additional comments emailed on date shown below.

Susanne Santi

Susan E. Sykes, Ph.D., C.Psych.
Director, Office of Research Ethics
OR
Susanne Santi, M. Math
Manager, Research Ethics

4/26/07
Date

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