Evaluating Smart Growth Efforts in Ottawa:

A Report Card for the Ottawa 20/20 Official Plan







Photos by Ottawa Tourism

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Abstract

Evaluative research of plan implementation and outcomes, including Smart Growth plans, is scarce in the planning literature; the adoption of Smart Growth policies by governments has gained in popularity even though little is known about the challenges and successes of implementing these policies on the ground. The following research attempts to address this gap through a case-study evaluation of the implementation of Smart Growth policies in Ottawa. The purpose is to assess the changes that have occurred since the Smart Growth policies in the Ottawa 20/20 Official Plan were adopted by the City in 2003, and to understand the challenges to plan implementation and evaluation. The evaluation framework consists of 21 indicators, representing seven quantifiable Smart Growth goals. The results of this evaluation reveal that the changes for some indicators are consistent with the Smart Growth goals of the Ottawa 20/20 Plan (e.g., housing options, suburban densities, intensification, and land use mix), the changes for other indicators are inconsistent with Smart Growth principles (e.g., cycling index, vehicle registration, and the preservation of agricultural and natural lands), and still others have changed very little or in ways that are mixed (e.g., employment in nodal centres, transit use, greenspace provision, and safety for active modes). Interviews conducted with three City of Ottawa planners provide further insight into the observed plan outcomes. The report ends with a list of lessons derived from Ottawa's experience with Smart Growth plan implementation and evaluation, which may prove useful for cities adopting Smart Growth plans.

Résumé

La recherche évaluative sur l'exécution et les résultats de plans est rare dans la littérature d'urbanisme. Ceci est particulièrement vrai pour les plans de Smart Growth. L'adoption de politiques Smart Growth par les gouvernements gagne en popularité, malgré une insuffisance d'information par rapport aux défis et aux réussites de la mise en œuvre de ces politiques en pratique. La recherche suivante tente de combler cette lacune à l'aide de l'évaluation d'une étude de cas sur la mise en œuvre des politiques de *Smart Growth* à Ottawa. Le but est d'évaluer les changements survenus depuis que les politiques de Smart Growth du Plan officiel d'Ottawa 20/20 ont été adopté par la Ville en 2003 ainsi que de comprendre les défis reliés à la mise en œuvre et l'évaluation de plans urbains. Le cadre d'évaluation est composé de 21 indicateurs qui représentent sept objectifs quantifiables du concept Smart Growth. Les résultats de cette évaluation révèlent que les changements de certains indicateurs sont cohérents avec les objectifs Smart Growth du Plan officiel d'Ottawa 20/20 (p.ex., les options de logement, la densité des banlieues, l'intensification et la diversité d'utilisations du sol). Par contre, les changements de certain autres indicateurs sont incohérents avec les principes de Smart Growth (p. ex., l'indice de cyclisme, l'immatriculation des véhicules et la préservation des terres agricoles et naturelles) tandis que d'autres ont très peu changé ou ont changé de manière mixte (p. ex., l'emploi dans les centres nodaux, l'utilisation du transport en commun, la fourniture d'espaces verts et la sécurité des modes actifs). Des entrevues menées avec trois urbanistes de la Ville d'Ottawa apportent des idées complémentaires aux résultats observés. Le rapport se termine avec une liste de leçons tirées de l'expérience d'Ottawa sur la mise en œuvre et l'évaluation de leur plan Smart Growth. Ces leçons peuvent être utiles pour les villes voulant adopter des plans de Smart Growth.

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Chapter 1:

Introduction

Planning approaches followed by governments in Canada after the Second World War resulted in sprawling cities, increased car dependency, and high levels of natural resource consumption and per capita pollution. Smart Growth is an alternative planning concept that incorporates the principles of sustainability in a proactive attempt to address these prevalent planning issues. Smart Growth policies set the stage for governments to take actions to ensure more compact development with a mix of land uses, housing types and transportation options to create more liveable cities, meanwhile curbing sprawl, protecting the natural environment, and increasing the efficiency of resource use (Smart Growth BC, 2008; Curran, 2003 as cited in Tomalty & Alexander, 2005).

The application of Smart Growth is rather complex, however, as it requires a dramatic shift from how most North American cities are currently planned and developed (Downs, 2005). Further, Smart Growth policies are multifaceted, bringing together considerations of land use, development control, transportation, infrastructure, housing, public health, fiscal policy, and economic development. Not surprisingly then, implementation of such a model is extremely complicated. This complexity has given rise to a gap between Smart Growth policy proposals and the outcomes of these policies on the ground (Tomalty & Alexander, 2005; Litman, 2003; among others). The academic literature evaluating Smart Growth policy implementation is rather sparse, particularly in Canada. Thus the adoption of Smart Growth policies has gained in popularity, even though little is known about the challenges and successes of implementing such policies. The same is true for evaluation research in planning in general.

1.1 RESEARCH PURPOSE

This research project addresses the gap in plan evaluation literature by assessing the implementation of a Smart Growth plan carried out in Canada. The case study chosen for this evaluation is the City of Ottawa's 20/20 Official Plan (OP) and relevant supporting plans. The purpose is to assess the changes that have occurred since the Smart Growth policies proposed in the Ottawa 20/20 Plan were officially adopted by the City of Ottawa in 2003. In addition, the project seeks to identify the challenges and barriers to the plan's implementation. This study will aid in bridging the gap between Smart Growth planning theory and practice.

The following research questions are explored:

- What changes have occurred since the Smart Growth policies in the Ottawa 20/20 OP were adopted by the City in 2003, and what might explain the implementation successes and failures?
- What lessons can be learned from the Ottawa case study regarding plan implementation and evaluation that would assist cities in future long-term planning initiatives?

1.2 REPORT STRUCTURE

The report begins by providing an outline of the general methods used in carrying out this research project. Next, a literature review provides background information on Smart Growth planning principles, and examines the current state and scope of plan evaluation through a scan of existing evaluation studies. This is followed by a chapter that provides a context for the Ottawa case study, describing the study area, the planning background of the Ottawa 20/20 initiative, as well as the specific plans examined in this report. The next chapter takes the reader through the development of the evaluation framework that forms the basis for assessing the outcomes of the Ottawa 20/20 Plan to date. The results of this evaluation are then presented and discussed. The report concludes with a summary of the lessons drawn from Ottawa's experience with Smart Growth plan implementation, thus helping to guide future applications of Smart Growth in Ottawa and elsewhere in North America.

Chapter 2: Methodology

This chapter summarizes the methods used in the four main phases that were carried out as part of this research project. These phases are: (1) a review of Smart Growth and plan evaluation literature; (2) a review of the Ottawa 20/20 OP and relevant supporting plans; (3) the development and application of an evaluative framework to assess the Ottawa 20/20 plan outcomes; and (4) interviews with key professional planners at the City of Ottawa.

2.1 LITERATURE REVIEW

Phase 1 of the research began with a review of literature on Smart Growth theory, to gain a better understanding of the planning concept and to identify the fundamental Smart Growth planning principles. The main resources for this review included the websites and publications of key Smart Growth-related organizations—for example, the Smart Growth Network, Smart Growth BC and the Sierra Club—as well as some academic literature. This review was essential for identifying the Smart Growth goals of the Ottawa 20/20 Plan, and for developing the plan evaluation framework that forms the basis of the analysis in Phase 3 of this project.

Next, a thorough review of plan evaluation literature was conducted to get a sense of the state of evaluation in planning practice, as well as to find other examples of studies that seek to assess the degree of impact that plans actually have "on the ground" once implementation begins. In addition to studies focused specifically on the assessment of Smart Growth plan outcomes,

evaluations of New Urbanist and various other types of plans were also examined. This review provided further insight into evaluation frameworks and specific indicators used in the evaluation of plan outcomes at various scales (e.g., state/provincial, regional, municipal, and neighbourhood). This review also shed light on the overall dearth of plan evaluation that occurs in practice relative to the vast number of plans that are developed, and the need to make evaluation an integral part of the routine planning process. Lastly, this literature review assisted in identifying potential questions for the professional interviews conducted later in the research process.

2.2 OTTAWA 20/20 PLAN REVIEW

Phase 2 of this project involved a thorough review of the Ottawa 20/20 OP, to confirm that the goals of the plan are based on Smart Growth principles and to identify which key Smart Growth goals are specifically highlighted in the Ottawa plan. Review of the Ottawa 20/20 OP also allowed the researcher to identify specific targets set out to monitor progress on the achievement of the plan's Smart Growth goals. The reviewed plans include the original 2003 Ottawa 20/20 OP, as well as the 2007 and 2011 consolidations. In addition, a few relevant supporting plans were also reviewed to identify more specific targets and indicators to assess progress on the OP Smart Growth goals. Details of the Ottawa 20/20 Plan review are described in Chapter 4.

2.3 EVALUATION FRAMEWORK

Phase 3 of this research project involved the development and application of an evaluation framework to assess the outcomes of the Ottawa 20/20 Plan to date. This evaluation framework consists of key Smart Growth goals, each with a series of measureable indicators to track progress on the achievement of these goals over time. The details of the evaluation framework, as well as the data sources used to carry out this Phase of the project are described in Chapter 5. For ease of reading, the specific methods used to calculate each individual indicator are summarized in Chapter 6 of this report, with the results of the evaluation of each indicator.

It is important to note that, given the limited scope of this project, only plan outcomes (the changes in the indicators through time) are examined; a detailed account of the specific outputs or actions that the City has taken over the years to affect these outcomes and to implement the Ottawa 20/20 OP are not examined herein, although some examples are provided in Section 4.4 of this report. Also, although some of the indicators used in this evaluation may have been suitable for statistical testing to indicate whether the changes observed over time are significant or not, such analyses are beyond the scope of this research project. This report simply presents the actual trends observed for each indicator over the timeframe for which data was available.

2.4 PROFESSIONAL INTERVIEWS

Phase 4 of this research project involved conducting interviews with professional planners in the City of Ottawa's Planning and Growth Management Department, to supplement the quantitative analysis carried out in Phase 3 with some level of qualitative investigation. These interviews were designed to gain insight on the successes, challenges and barriers of the Ottawa 20/20 Plan implementation to date. Interviewees included planners who were involved in the development and/or the implementation of the Ottawa 20/20 Plan. As a result of the tight timeline for carrying out this project, only three City employees were interviewed; a list of these interview participants is provided at the end of the report. Ethics Review Approval from McGill's Research Ethics Board was granted prior to the start of the interviews (refer to the Appendix for the approval notice).

Interviews were conducted over the telephone or at the interviewee's office, and ranged from 30 to 60 minutes in duration. In general, interviews were conducted following the completion of Phase 3 of this research project, to allow for the opportunity to discuss the plan outcome results with the interviewees. Although an interview guide was prepared with a series of questions on plan implementation and evaluation (refer to the Appendix for the complete interview guide), the interviews were conducted in a semi-structured manner to allow for greater discussion of the plan outcomes. Due to time constraints, not all questions in the interview guide were asked during each interview.

Chapter 3:

Literature Review

This chapter summarizes the key findings of the literature review carried out in Phase 1 of this research project. The two main purposes of this review were to: (1) gain a better understanding of the Smart Growth planning concept, and (2) to gain insight into the current state of plan evaluation in practice and existing plan evaluation frameworks. The literature review findings are summarized in two separate sections, the first exploring the Smart Growth planning concept, and the second examining the existing literature on plan evaluation.

3.1 SMART GROWTH

Recent years have been marked by the increasing recognition that the conventional growth and development patterns of cities are largely contributing to environmental degradation, health problems, social inequality, and public deficits. With this realization, Smart Growth policies have been gaining attention as a potential alternative. Smart Growth BC defines Smart Growth as "a collection of land use and development principles that aim to enhance our quality of life, preserve the natural environment, and save money over time" (Smart Growth BC, n.d.). The origins and key principles of Smart Growth theory are briefly explored below.

3.1.1 ORIGINS OF SMART GROWTH

While the Smart Growth concept as known today had its origins in the U.S. in the 1990s, some precursors to this concept in the form of growth controls and growth management efforts date as far back as to the 1960s (Knaap, 2006). In the mid-1990s, Smart Growth began to take root in the

U.S. as a response to the sprawling suburbs and declining city cores that dominated the landscape across the country after decades of unmanaged growth. Various organizations joined together to form Smart Growth networks, which advocated Smart Growth principles and provided research, best practices, news and discussions on the topic. State governments also began incorporating Smart Growth principles into their plans and programs to provide regulatory frameworks and financial incentives for adopting more sustainable growth patterns (Tomalty & Alexander, 2005). Maryland was the first State to take up the Smart Growth concept, passing the *Smart Growth and Neighborhood Conservation Act* in 1997 (Knaap, 2006).

It took longer for the Smart Growth concept to catch on in Canada, as the issues in Canadian cities were not quite as extreme as in some parts of the U.S. (Tomalty & Alexander, 2005). British Columbia was the first to take up Smart Growth in Canada with the establishment of Smart Growth BC, a non-governmental organization, in 1999. Local governments and other organizations took notice and soon followed suit. In 2001, the Ontario Conservative government inaugurated the Smart Growth Ontario initiative; however, this program was controversial as some elements of the program did not fully adhere to the Smart Growth concept. Around the same time, in June 2001, the City of Ottawa held a Smart Growth Summit to kick off a two-year comprehensive planning process for managing growth in the city over the next 20 years (discussed further in Section 4.2.1 of this report). A number of other municipalities across Canada also adopted Smart Growth programs in the early 2000s, including Guelph, Niagara, Kitchener, Hamilton, Edmonton, and Halifax. In May 2003, the Smart Growth Canada Network, a national organization made up of non-governmental organizations from across the country, was founded to help advance the implementation of Smart Growth Canada Network, 2007).

3.1.2 Smart Growth Principles

Various organizations including Smart Growth BC, the Smart Growth Canada Network, the U.S. Environmental Protection Agency and the Sierra Club, have developed a list of key Smart Growth principles. A list of the specific principles recognized by some of the main Smart Growth-related organizations is provided in the Appendix. Although the details and the number

of principles vary among organizations, several key goals are common in most of these listings. The list below summarizes the 10 most commonly accepted principles from these sources:

- 1. Create a range of housing options
- 2. Create compact neighbourhoods
- 3. Strengthen and encourage growth in existing communities
- 4. Strengthen the urban structure (with activity centres connected by transit)
- 5. Promote a mix of land uses
- 6. Promote a variety of transportation options
- 7. Conserve and enhance open space, agricultural land, and sensitive natural lands
- 8. Foster distinctive communities with a strong sense of place
- 9. Ensure a broad-scale, integrated approach to planning
- 10. Encourage community and stakeholder collaboration in decision-making

3.2 PLAN EVALUATION

This current research project focuses on plan evaluation as the "post hoc evaluation of plan outcomes" (Baer, 1997), posing questions like: "To what extent have plans been successfully implemented? Where have they failed and where have they achieved their goals? How could such an investigation be approached empirically?" (Talen, 1996a, p.79). This section summarizes the existing literature on plan evaluation, first describing the current state of evaluation in planning practice, and then examining specific studies that implemented evaluation frameworks to measure outcomes.

3.2.1 STATE OF EVALUATION IN PLANNING PRACTICE

It has been noted that "the Achilles' heel of major planning efforts has always been the obstacle encountered when transforming planning policies into new development and community building practices on the ground" (Pembina Institute, 2007, p.93). Given the amount of time and resources put into plan development, one might expect that a similar amount of energy goes into evaluating whether these plans are being implemented and producing the intended outcomes on the ground. The literature on plan evaluation, however, demonstrates that this is far from being

the case, despite the fact that monitoring and evaluation are recognized steps in the planning process (Seasons, 2003). Several articles have noted the lack of studies that directly evaluate the implementation of plans, particularly empirical studies that undertake a quantitative assessment of plan outcomes against set goals and targets (Talen, 1996a; Talen, 1996b; Seasons, 2002; Seasons, 2003; Brody & Highfield, 2005; among others). Talen (1996b) asserts that the lack of plan evaluation in practice "[limits] the potential for generalization about what does or does not work in planning" (p.249). It is not enough to implement plans and simply assume successful implementation; outcomes and impacts must also be examined (Kusek & Rit, 2004).

In his survey of 14 Ontario municipalities, Seasons (2003) found that "many planners do not (or cannot) monitor or evaluate their activities in a consistent, formal, or regular way in practice" (p. 431). It was also found that plan evaluations that are carried out typically focus on the assessment of outputs (e.g., efficiency-based measures such as the number of programs implemented), rather than the outcomes of actual plan implementation. Furthermore, much of the evaluation that is carried out at the municipal level is linked to provincial reporting requirements, while the evaluation of other plan elements occurs less frequently (Seasons, 2002). The literature cites several potential challenges to effective and consistent plan evaluation, including: resource constraints (e.g., time, money, expertise); the lack of support for plan evaluation within the organizational culture (e.g., for fear of criticism); difficulty in obtaining or the lack of appropriate data; the lack of clearly articulated goals and target outcomes in planning documents; the unclear meaning of "success" (Seasons, 2003; Waldner, 2004; Talen, 1996a; Talen, 1996b; Murtagh, 1998).

There are several benefits to carrying out plan evaluations. For instance, plan evaluations uncover what is and is not being implemented successfully, thus presenting an opportunity to improve plans/programs accordingly so as to enhance planning activities (Talen, 1996b; Seasons, 2003). Moreover, plan evaluations can help to legitimize planning practice, and improve the efficiency of planning procedures (Waldner, 2004). The literature strongly emphasizes the need to make evaluation an integral part of the routine planning process (Talen, 1996b; Seasons, 2002; Seasons, 2003; Pembina Institute, 2007). Some scholars have even suggested that municipal

planning documents should include a section outlining evaluation mechanisms for plan implementation (Talen, 1996b; Seasons, 2002).

Seasons (2003) concluded that "the ideal monitoring and evaluation model is often unrealistic and rarely attainable in its entirety. However, a truncated monitoring and evaluation process may be better than none" (p. 432). Research suggests that in order for evaluation to realistically be carried out on a continual basis, the evaluation methods must be simple, easy to understand, and tailored to the needs and resource availability of each municipality (Seasons, 2002; Seasons, 2003). Thus, it is preferable for a municipality to continuously and consistently track a small number of meaningful performance indicators, rather than measuring a large number of futile indicators on an ad hoc basis. Kusek and Rist (2004) stress the importance of choosing the "CREAM" of good indicators, noting that effective evaluation indicators must be: Clear, Relevant, Economic, Adequate, Monitorable (p.68).

3.2.2 PREVIOUS EVALUATION STUDIES

Several existing studies and research reports have attempted to evaluate the outcomes related to the implementation of specific plans. As discussed in the previous section, however, the literature related to the physical outcomes of plans is rather limited relative to the number of plans created. Nevertheless, this section explores studies that employ a variety of methods to evaluate the implementation of plans and programs. Assessments of Smart Growth, New Urbansim, transit-oriented development, and sustainability plans are examined in this section.

The most comprehensive study on Smart Growth implementation to date stems from a two-year research project led by the Lincoln Institute of Land Policy, which involved 21 research contributors (Ingram et al., 2009). The study carries out an empirical analysis to evaluate the effectiveness of statewide Smart Growth policies in four states—Florida, Maryland, New Jersey, and Oregon—from 1990 to 2000. The implementation of land management policies in four additional states (Colorado, Indiana, Texas, and Virginia) is also examined. The analysis uses a total of 52 indicators and data from various state and local datasets (e.g., U.S. Census data) to

determine the effectiveness of these policies in achieving five widely recognized Smart Growth goals: 1) promote compact development; 2) protect natural resources and environmental quality; 3) provide and promote a variety of transportation options; 4) supply affordable housing; and 5) create net positive fiscal impacts (Ingram et al., 2009). Although none of the states examined performed well across all five Smart Growth objectives, the results do provide quantitative evidence of the effectiveness of Smart Growth policies (Ingram et al., 2009).

Another U.S. study evaluating the achievement of Smart Growth goals established a set of quantitative measures for five dimensions of compact urban development: street network connectivity, density, land use mix, accessibility, and pedestrian walkability (Song, 2005). This framework was applied to three case-study areas (Portland, Oregon; Orange County, Florida; and Montgomery County, Maryland). The results show that Smart Growth policies have brought about positive changes in subdivision design in all three areas, although Smart Growth policies to improve land-use mix and to increase regional accessibility are lacking (Song, 2005).

A study by Shen and Zhang (2007) examined the effectiveness of the Smart Growth initiatives in Maryland, using binary logit models to characterize land-use change from nonurban to urban, for both a pre-Smart Growth period (1992-1997) and a post-Smart Growth period (1997-2002). The results of their analysis reveal that Smart Growth policies in Maryland have generally been successful in achieving their stated goals, although there are significant differences in the level of policy effectiveness across the local counties examined.

A report prepared by Cambridge Systematics Inc. (2004) reviewed various methods used to evaluate the effectiveness of state and regional Smart Growth and other comprehensive planning initiatives, to better understand how the impacts of these initiatives can be evaluated. In this report, a total of 59 studies evaluating Smart Growth-related plans, programs, policies, acts and standards were identified. The majority of the examined studies, however, conducted qualitative evaluations that simply described the policies and their overall effectiveness. Only a few of the studies examined actually employed quantitative evaluation frameworks using measurable indicators to link resulting trends to specific Smart Growth policies, and most of these studies only examined one or two Smart Growth principles (Cambridge Systematics Inc., 2004). The

report summarizes the various indicators used in these quantitative studies to measure the impact of Smart Growth policies (see Table 4.2 of Cambridge Systematics Inc., 2004, p. 4-28).

Several other U.S. studies have examined the implementation of Smart Growth policies over time, but have not conducted a full quantitative assessment to empirically evaluate outcomes of these policies. Rather, these studies have focused on describing the types of policies that are adopted, some general outcomes, the challenges with Smart Growth implementation, and/or the lessons that could be learned from Smart Growth implantation in the U.S. to date. Some examples include: Burchell, Listokin and Galley (2000); Downs (2005); Forsyth (2005); Frece (2005); Gray (2007); Knaap & Frece (2007); Talen and Knaap (2003); among others.

Although there are far fewer examples of Smart Growth evaluation in the Canadian literature, some examples exist. A study by Tomalty and Alexander (2005) examined the implementation of Smart Growth in Canada, evaluating the extent to which each stated Smart Growth goal was achieved in practice. The analysis focused on six regions— Halifax Region, Montreal Region, the Greater Toronto Area, City of Saskatoon, City of Calgary, and Greater Vancouver Regional District—that implemented long-term growth management strategies that are now considered Smart Growth. The evaluation framework used in this study consisted of 10 indicators, some of which include: mixing of uses, range of housing types, preservation of agricultural lands, employment directed to designated centres, among others. The results revealed "a large gap between the stated growth management policies found in the planning documents of the six study regions and accomplishments on the ground" (Tomalty & Alexander, 2005, p. 10).

The Pembina Institute (2005) conducted a study evaluating the implementation of Smart Growth policies in three Ontario municipalities facing strong growth pressures and who, at the time, had recently adopted new Smart Growth policies. The examined regions were: the City of Ottawa, the Region of Waterloo, and York Region. The authors established a framework consisting of 11 general indicators to assess the implementation of the Smart Growth plans in these three communities to date (see Table 1 of Pembina Institute, 2005, p. 15). Similar to the results in the previous Canadian study, this analysis showed that all three regions were struggling with the implementation of their respective Smart Growth plans. It is important to note, however, that this

study attempted to evaluate the impact of these local Smart Growth policies only a couple of years following their implementation; the authors therefore recognized that these policies were still a work in progress (Pembina Institute, 2005).

Several studies have attempted to evaluate the implementation of plans with similar goals to Smart Growth plans, including New Urbanism, transit-oriented development and community sustainability plans. Although a comprehensive review of the implementation of these planning concepts is beyond the scope of this project, a few key evaluation studies are examined here. Additional plan evaluation studies that were examined for evaluation framework ideas but that are not discussed below, include: Talen, 1996a; Southworth; 1997; Brody and Highfield, 2005.

Some studies have evaluated the implementation of New Urbanist plans in Canada, using a variety of criteria to assess whether New Urbanist principles are achieved on the ground and whether they differ from conventional developments (Grant and Bohdanow, 2008; CMHC, 2010; Gordon & Vipond, 2005). Overall, the results of these analyses reveal that the New Urbanist developments performed better than conventional developments. Further, the examined projects generally succeeded in achieving higher gross densities, creating a mix of housing types at the project level, ensuring some mix of uses, and providing attractive open space and inviting pedestrian environments. Some areas that were less successful include ensuring housing mix at the block level, ensuring the viability of commercial uses within the development, developing fully connected street networks, ensuring a high transit mode split, and providing access to appropriate jobs (Gordon & Vipond, 2005; Grant & Bohdanow, 2008; CMHC, 2010).

A study conducted by Brinklow (2010) evaluates the success of post-development transitoriented development projects throughout North America. Many of the evaluation criteria used in this analysis are similar to those used in evaluation analyses of Smart Growth plans. The study found varying levels of success among the developments examined, but found that Arlington, Virginia had most successful transit-oriented development projects (Brinklow, 2010). Orenco Station in Portland, Oregon has been the subject of many studies evaluating the implementation of transit-oriented development and New Urbanism plans (for example, Bae, 2002; Podobnik, 2002, and Brinklow, 2010). Using a variety of indicators to evaluate its implementation success, these studies have found that while Orenco Station has achieved some of the core goals of transit-oriented development and New Urbanism, it does not take full advantage of its proximity to transit and car-dependence remains high (Brinklow, 2010; Bae, 2002).

The Pembina Institute (2007) conducted an evaluation study on the community sustainability of 27 Ontario municipalities, including the City of Ottawa. Although this study did not directly evaluate the implementation of municipal plans, the researchers developed and employed an evaluation framework consisting of 33 indicators in three broad categories (Smart Growth, livability and economic vitality) to enable communities to track their progress toward achieving sustainability goals. The City of Ottawa ranked second in the overall Sustainability Index after the City of Toronto, and ranked fifth for the Smart Growth Index.

There are also international examples of plan evaluation studies, including: an evaluation of the implementation of Smart Growth principles in Chinese Official Plans (Chen, 2008); a study of plan implementation success of local sustainability plans from six district councils in New Zealand (Berke et al., 2006); an evaluation of the community impacts of urban policies in the United Kingdom (Murtagh, 1998); an evaluation of New Urbanist policies in neighbourhoods in Perth, Australia (Falconer, Newman & Giles-Corti, 2010); and a study to develop a robust analytical framework consisting of a coherent and integrated set of indicators to evaluate spatial planning outcomes in England (Royal Town Planning Institute, 2008).

Overall, the results of existing evaluation studies show mixed outcomes for the implementation success of plans on the ground. Ingram et al. (2009) found that the performance outcomes of state-wide Smart Growth plans in the U.S. highly reflected the priorities of the state; policy goals that were found to have the least success during the study period were those that were given little priority by the state. In Canada, barriers to successful implementation often stem from the lack of clear and consistently enforced provincial policies related to a variety of Smart Growth goals, particularly with respect to the protection of agricultural lands and natural features, as well as transportation planning (Tomalty & Alexander, 2005). Transportation-related outcomes, in many cases, reflected spending priorities. It was found that investments to improve and expand transit services often resulted in increased transit use, whereas automobile use continued to

increase in areas that continued to prioritize investments for roads and highways (Tomalty & Alexander, 2005; Pembina Institute, 2005). Conflicting priorities at local, provincial and federal levels of government, and conflicting goals between land use planners and transportation planners/engineers also contribute to mixed transportation outcomes (Song, 2005; Tomalty & Alexander, 2005). Moreover, despite decreases in lot sizes and the construction of more compact housing forms in suburban areas, densities to support viable transit service are increasingly challenged by decreases in household size (Tomalty & Alexander, 2005; Grant & Bohdanow, 2008).

There is also literature that demonstrates how various fiscal instruments "work in opposition to planning objectives for more compact urban growth and reurbanization" (Blais, 2010, p. 172). For example, development charges required of developers to help pay for the cost of the infrastructure to support new development (such as roads and sewers), are often averaged out across the municipality despite variations in development types in different areas (Blais, 2010). This current structure essentially subsidizes suburban development, particularly in greenfield areas where the cost of new infrastructure is very high. Similarly, property taxes are currently based on the market value of the building and the land; however, property and homes in suburban areas are generally less expensive than in urban areas. Therefore, the current structure for property taxes also acts as a disincentive to intensification, since property values and taxes are much higher in the urban core. Blais (2010) suggests that "more efficient infrastructure and urban form could be realized through greater use of marginal cost pricing in appropriate circumstances... that takes location, density, land use, or other relevant urban form factors into account as drivers of cost" (Blais, 2010, p. 172-173). Blais (2010) asserts that employing such an approach could yield development charges that reflect the actual costs of providing the infrastructure and property taxes that consider the lot size and the land only, which could help to facilitate the uptake of Smart Growth policies on the ground.

In addition, it was found that local regulations and development standards are often contradictory to sustainable land use goals, as these standards are obsolete and have to be updated to ensure the viability of more compact, innovative development projects. These factors exacerbate the overall lack of interest in the development community to undertake more efficient and sustainable

development projects (Tomalty & Alexander, 2005). The observed lack of success in the mixing of land uses in some studies, particularly in residential neighbourhoods, may be related to developer perceptions that retail uses will not be successful in residential areas, and that homes adjacent to commercial uses will be more difficult to sell (Song, 2005; Tomalty & Alexander, 2005; Grant and Bohdanow, 2008). In some cases, competition with nearby big box retail and outlet malls proved to be detrimental to local commercial uses (Grant & Bohdanow, 2008). Some projects locate commercial uses along the periphery of developments, closer to highways and major arterial roads, to attract more business from vehicular traffic while limiting pedestrian access from many of the homes within the development (Grant & Bohdanow, 2008; Brinklow, 2010).

Sustained consumer preference for large single-family homes with garages was also noted as a significant barrier to plan implementation (Tomalty & Alexander, 2005; Pembina Institute, 2005; Grant and Bohdanow, 2008). Grant and Bohdanow (2008) found that many New Urbanist projects started out with plans that offered a range of housing types and high densities, but the plans underwent dramatic changes during the development process, resulting in later phases that succumbed to consumer preferences for conventional development forms. In addition, opposition to change by residents of existing neighbourhoods was found to be common, particularly with regard to intensification projects, despite support for Smart Growth principles in public meetings (Tomalty & Alexander, 2005).

In conducting plan implementation assessments, the studies examined herein have highlighted a diversity of indicators that could be useful in developing the evaluation framework for this current study. A list of the various evaluation studies examined in this literature review and a summary of the most commonly used evaluation indicators for each plan type is provided in Table A1 in the Appendix.

Chapter 4: Ottawa Planning Context

This chapter provides a summary of contextual information for the Ottawa case study examined in this research project. The City of Ottawa was chosen for this case study evaluation for several reasons, including pre-existing connections to the city itself and existing contacts. In addition, the City of Ottawa has one of few Smart Growth-based plans that was adopted early enough to allow for evaluation (i.e., it was adopted nine years ago). The availability of resources and the support of City staff in providing data and information for this project also contributed to the selection of Ottawa for this case study. This chapter begins with a brief profile of the City of Ottawa itself, followed by a look at the origins of the Ottawa 20/20 initiative, a summary of the process and outcomes of the initiative, a summary of the key Ottawa 20/20 plans that are relevant to the analysis carried out in this research project, and finally a listing of examples of actions taken by the City to implement the Ottawa 20/20 OP.

4.1 **PROFILE OF OTTAWA**

Ottawa, the nation's capital city, is the fourth-largest city in Canada and the second-largest city in the Province of Ontario. Located in the Ottawa Valley in eastern Ontario, the city sits along the banks of the Ottawa River which divides the provinces of Ontario and Quebec and separates the City of Ottawa from the City of Gatineau (Figure 1). As part of the National Capital Region, the City of Ottawa collaborates with the City of Gatineau, the Federal Government and the National Capital Commission on various regional planning efforts.



FIGURE 1. Map of the regional context of the city

The current City of Ottawa was formed by the amalgamation of 11 urban and rural municipalities¹ and the former regional municipality of Ottawa-Carleton into one single-tier municipality on January 1, 2001. This amalgamation transformed Ottawa from "a modest city on the banks of the Ottawa River to a large, complex and diverse urban region" (City of Ottawa, 2003, p. 3). The amalgamated City of Ottawa has a total area of 2,791 square kilometers (1,077 square miles), nearly 80% of which is rural. The Greenbelt, covering an area of 209 square kilometres, is a distinctive characteristic of Ottawa and comprises natural features such as forests and wetlands, agricultural land, as well as some employment uses. Although its original purpose was to halt urban sprawl, amalgamation has resulted in the Greenbelt now sitting in the centre of the city, separating the city's urban area from suburban areas located beyond the Greenbelt. The purpose of the Greenbelt now is to preserve natural features and agricultural land, as well as reserve land for institutional purposes.

¹ The 11 municipalities joined in the 2001 amalgamation are: Cumberland, Gloucester, Goulbourn, Kanata, Nepean, Osgoode, Ottawa, Rideau, Rockcliffe Park, Vanier, and West Carleton.

Figure 2 illustrates some of the general land designations in Ottawa (urban, rural and the Greenbelt) and labels the city's major planning subareas, which are referred to throughout this report. Given limitations on the availability of geographic (GIS) data, all of the planning subareas located inside² the Greenbelt are considered as a single subarea in this research project, shown in red on the map. The orange areas represent the city's six suburban areas that are located outside of the Greenbelt; these suburban areas are still within the city's designated urban area.



FIGURE 2. Map of the City of Ottawa's general land designations and major planning subareas

Ottawa's current population has reached over 900,000 individuals living in just over 380,000 households. The city is also becoming increasingly cosmopolitan, with approximately 25% of residents born outside of Canada, and with visible minorities representing more than 20% of residents. Ottawa's economy is dominated by the high-technology, public service, tourism,

 $^{^{2}}$ In keeping with the City's use of the terms "inside" and "outside" the greenbelt, "inside the greenbelt" refers to the area surrounded by the arc formed by the greenbelt rather than just the land within the greenbelt itself, while "outside the greenbelt" refers to the areas located beyond the greenbelt boundary (refer to Figure 2).

education, and health sectors. The city also has a highly educated workforce with more engineers, scientists and PhD graduates per capita than any other Canadian city (City of Ottawa, 2012). In 2010, the Ottawa-Gatineau Census Metropolitan Area had the third highest average personal income per capita (\$42,715) among Canada's six major cities, 14% above the national average (City of Ottawa, 2011a). Ottawa ranked 18th in a survey of 200 cities worldwide for best quality of life, conducted by Mercer Human Resources International.

4.2 **OTTAWA 20/20 CONTEXT**

This subsection provides a brief background on where the Ottawa 20/20 initiative came from, what the process entailed, and what outcomes this planning process produced. This context sets the stage for the subsequent chapters of this report, which explore the implementation of the Smart Growth goals of the Ottawa 20/20 OP.

4.2.1 ORIGINS OF THE OTTAWA 20/20 INITIATIVE

The 2001 amalgamation meant that the City of Ottawa was now responsible for providing services to a much larger population, spread over a much large area that included urban and suburban areas, as well as large rural expanses. In addition, the city's population was expected to continue to grow in the coming years, pushing beyond one million residents by 2021. The number of jobs in Ottawa was also expected to grow to approximately 640,000 by 2021 (City of Ottawa, 2003b). By the early 2000s, it had become clear that there was an urgent need to manage growth in Ottawa, to ensure that the City would be able to accommodate the expected growth levels, while still preserving natural and agricultural lands from further spread of the city.

At the same time, the City of Ottawa faced significant pressures for increased infrastructure, such as roads, water, sewers and telecommunications infrastructure to accommodate its growing population. Prior to 1997, several provincial grants for road and transit projects helped to subsidize major infrastructure projects in Ottawa, such as the construction of the Transitway (the city's bus-rapid transit network) and some of the city's major arterial roads (City of Ottawa, 2001). However, significant restructuring of the provincial government in the mid-1990s, under

Premier Mike Harris' Common Sense Revolution, greatly affected municipalities in Ontario (Winfield & Jenish, 1999). Substantial tax cuts, limitations on property taxes, as well as a transfer of a range of provincial responsibilities to municipalities were key features of this restructuring process. As of January 1997, the Harris Government announced significant cuts in provincial funding for the construction and operation of transit, sewer and water infrastructure, thus making it increasingly difficult for Ontario municipalities to finance infrastructure projects (Winfield, 2003). A study conducted in February 2001 by accounting firm KPMG LLP examining tax revenue generation in Ottawa (including personal income tax, corporate tax, payroll taxes, GST, PST, gas taxes and property taxes) further explains the increasing challenge of infrastructure provision facing municipalities at the time. The study found that federal and provincial governments take nearly 90% of the revenues from tax revenues, leaving cities with less than 10% of the revenues (City of Ottawa, 2001). The combination of limited tax revenues and the loss of important provincial funding for infrastructure projects resulted in increased financial stress for municipalities with respect to infrastructure projects resulted in increased

Facing the challenges of considerable growth and overwhelming infrastructure costs, the City of Ottawa recognized that traditional development patterns were too costly and inefficient, and that a new approach was needed if the City was going to effectively and sustainably meet the needs of its growing population. With amalgamation in 2001, the timing was right for the development of a new OP for the City. Ottawa's Mayor at the time, Bob Chiarelli, was a strong proponent of Smart Growth policies as a means of managing growth and ensuring more efficient infrastructure provision. Under the Mayor's lead, the City of Ottawa initiated a two-year comprehensive planning process, the Ottawa 20/20 initiative, to establish "a framework for managing growth over the next 20 years in ways that will reinforce the qualities most valued by the city's citizens" (City of Ottawa, 2003, p. 3). Smart Growth principles were deeply rooted in the Ottawa 20/20 initiative, which focused on the integration of economic growth, social equity, and environmental management to ensure the sustainable growth of the city (City of Ottawa, 2003b).

4.2.2 OTTAWA 20/20 PROCESS & OUTCOMES

The Ottawa 20/20 process began in June 2001, with a five-day Smart Growth Summit, led by Mayor Chiarelli. The purpose of the summit was to bring together citizens and local businesses to work in collaboration with City staff and other invited planning and design professionals to create a shared vision for managing growth in the new City Ottawa over the next 20 years. The summit involved discussions of the challenges that lay ahead for the City of Ottawa, and explored how the concept of Smart Growth could be applied to the Ottawa context to help proactively address these issues (Bowsman, 2007). The summit was very successful in its outreach as hundreds of participants attended each day, and the webcast of the summit offered additional opportunities for community input through emails and online chatroom discussions.

The summit activities and subsequent public consultations in early 2002 led to the development of seven guiding principles for the Ottawa 20/20 process that were approved by City Council in June of 2002. The purpose of these principles was to ensure that all of the plans to come out of the Ottawa 20/20 Growth Management Strategy shared a consistent vision across all policy fields (City of Ottawa, 2003). These seven guiding principles are:

- A Caring and Inclusive City
- A Creative City Rich in Heritage, Unique in Identity
- A Green and Environmentally Sensitive City
- A City of Distinct, Liveable Communities
- An Innovative City Where Prosperity is Shared Among All
- A Responsible and Responsive City
- A Healthy and Active City

At the end of the two-year comprehensive planning process in 2003, the Ottawa 20/20 initiative resulted in a series of five growth management plans: the OP, the Human Services Plan, the Arts and Heritage Plan, the Economic Strategy, and the Environmental Strategy. Each of these core plans has a series of supporting plans to provide more detailed strategies for certain policy areas. Figure 3 shows the overall structure of the resulting components of the Ottawa 20/20 initiative.



Source: City of Ottawa, 2003a

FIGURE 3. The resulting components of the Ottawa 20/20 initiative

4.3 OVERVIEW OF RELEVANT OTTAWA 20/20 PLANS

An assessment of the implementation of the entire Ottawa 20/20 Growth Management Strategy is beyond the scope of this research project. As outlined in Chapter 2, this research project focuses mainly on the implementation of the Ottawa 20/20 OP, although some of the OP's supporting plans are also examined. This subsection summarizes some of the general findings of the review of the Ottawa 20/20 OP, and supporting plans.

4.3.1 RELEVANT PLANS

The Ottawa 20/20 OP was the most relevant plan for this research project, as it provides a longterm vision and policy framework to guide the city's future physical development patterns. The Ottawa 20/20 OP was the first comprehensive plan for the newly amalgamated City of Ottawa, a now more populous and expansive city. Since its adoption in 2003, the OP has undergone several revisions. The versions of the OP that were reviewed for this research project include the original 2003 Ottawa 20/20 OP, as well as the revised 2007 and 2011 consolidations of the OP.

The main goal of reviewing the OP was to ensure that the Ottawa 20/20 plan is in fact based on Smart Growth principles, as well as to identify specific goals and targets that are set in the plan in order to develop the evaluation framework for this research project. Reviewing these three editions of the OP revealed that the plan is strongly based on Smart Growth principles, in keeping with the rest of the Ottawa 20/20 Growth Management Strategy. It was also found that the general Smart Growth goals remained consistent in all three consolidations. Although the goals set out in the OP touched on most of the key Smart Growth principles, these goals were not always clearly articulated in specific policies. Review of the OP also uncovered a few specific targets that were relevant to the Smart Growth goals of the plan. However, it was found that some specific targets were either modified or added over time in the various consolidations of the OP. For instance, specific intensification targets were only introduced in the 2011 consolidation of the plan in response to new provincial requirements. For the purpose of this research project, specific goals and targets are derived from the original 2003 OP, unless otherwise indicated in Chapter 6 of this report.

In addition to the review of the Ottawa 20/20 OP, the OP's supporting plans were also reviewed to identify additional specific targets and indicators to assess progress on the OP Smart Growth goals. In particular, the City's Transportation Master Plan (TMP) was reviewed to identify specific indicators for the Smart Growth goal aimed at promoting a variety of transportation options. Annex C of the TMP sets out a framework of established transportation performance objectives and indicators as part of the City's plan to internally monitor progress on the implementation of the TMP over time. The list of transportation indicators and objectives presented in the TMP was too extensive for the purpose of this research project. As such, only a few indicators were selected for each major mode of transportation to be assessed in this project.

The Greenspace Master Plan and the Infrastructure Master Plan, other supporting plans under the Ottawa 20/20 OP, were also briefly reviewed as part of this process to identify more specific

indicators and targets related to the Smart Growth goals of the Ottawa 20/20 OP. Review of these plans, however, did not reveal any specific targets and indicators that would be relevant to this project that were not already outlined in the OP. Therefore, for the purpose of this research project, no specific goals or targets were derived from the Greenspace Master Plan or the Infrastructure Master Plan.

A list of the specific goals and targets derived from the review of the relevant Ottawa 20/20 plans is provided in Chapter 5 of this report, which describes the development of the evaluation framework used in this research project. The specific source of the goal or target set out for each individual indicator examined in this analysis is provided in Chapter 6.

4.3.2 DEFINING THE PLANNING HORIZON

The planning horizon is the point in time until which the OP sets a vision and strategic framework for development. In the original 2003 OP and the 2003 TMP, the planning horizon is defined as 2021. Therefore, all of the goals and targets set out in these editions of the Ottawa 20/20 plans are expected to be achieved by 2021. However, with the review of the OP in 2011 and the TMP in 2008, the planning horizon shifted to 2031. Therefore, the goals and targets set out in the 2011 consolidation of the OP and the 2008 revision of the TMP are expected to be achieved by 2031.

This change in the planning horizon between the various editions of the Ottawa 20/20 plans makes it somewhat difficult to assess whether certain indicators are on track to meet their set target. Many of the goals and targets set out in the original 2003 OP and TMP remain the same in the later revisions of the plan, although the planning horizon has increased by 10 years. An example of this is the city-wide mode split/share targets set out in the OP and the TMP; the specific targets do not change at all, but the date by which to achieve these targets changes from 2021 to 2031. Therefore, for the purpose of this analysis, the results indicate whether the examined trend imply that a given target will successfully be met by the 2021 planning horizon and/or by the revised 2031 planning horizon (unless a more specific timeline is indicated for a given target).

4.3.3 MONITORING & REPORTING ON PROGRESS

As indicated in the public document "A Window on Ottawa 20/20" and Section 5.5 of the 2003 OP, the City of Ottawa planned to report on the progress of the implementation of the Ottawa 20/20 Growth Management Strategy, including the OP, through an annual Report Card (City of Ottawa, 2003a; City of Ottawa 2003b). The OP noted that the "implementation of these plans can be strengthened though an integrated program of monitoring and reporting on performance through an annual Report Card... based on a set of indicators that best reflect our successes and failures" (City of Ottawa, 2003b, p. 159).

The City intended to present the annual Report Card in both a summary brochure format and a lengthier technical document containing greater discussion on the relationship between indicators and principles, and the linkages among indicators. Both formats of the annual Report Card were to be organized using the seven Ottawa 20/20 guiding principles listed in Section 4.2.1 above, noting both activity *outputs/actions* (what the City has done) and plan *outcomes* (what progress is being made toward achieving the plan goals). Three or four indicators were to be identified for each of the seven principles, to measure the plan outcomes over time (City of Ottawa, 2003a).

In the end, the implementation of the Ottawa 20/20 Growth Management Strategy monitoring program and the annual Report Card was never fully implemented. Bowman (2007) points out that the planned annual Report Card has been "supplanted" by the City's Annual Report. However, much of what is reported in the Annual Report is outputs-based, summarizing the various actions that the City has taken over the given year to achieve various plan goals and priorities; monitoring of the Ottawa 20/20 Plan outcomes is rarely included (although a few indicators such as transit ridership and development in target areas have been included in some editions of the Annual Report, but not regularly). The 2004 Annual Report most closely follows the format of the proposed annual Report Card, summarizing the year's achievements by each of the seven Ottawa 20/20 guiding principles.
Although the annual Report Card for monitoring progress on the implementation of the Ottawa 20/20 Strategy was never realized, the City still collects data to track progress on several of the goals and targets set out in the OP and supporting plans on a regular basis through various inhouse monitoring activities. For example, each year the City publishes an Annual Development Report, which tracks progress on several of the City's policy goals and targets set out in the OP, such as the intensification targets. The goals and targets tracked in the Annual Development Report are discussed further in Chapter 6 of this report. Additional data collection relevant to the goals of the OP is carried out by the City through several in-house monitoring activities, including the Vacant Urban Residential Land Survey, the Employment Survey, and the Land Use Survey. These are also discussed in greater detail in Chapter 6 of this report.

In addition, as mentioned in Section 4.3.1 above, Annex C of the TMP sets out a framework of specific objectives and indicators to monitor progress of the implementation of the TMP over time. Since the adoption of the TMP in 2003, the City has commissioned a review of the progress on these indicators by an independent consulting firm, carried out in two separate phases. The first phase of this assessment is summarized in the "Transportation Performance Objectives and Indicators Report – Phase I", completed in December of 2005 (City of Ottawa, 2005). This first phase assessed the progress on approximately two-thirds of the indicators set out in the TMP's monitoring framework. In September 2008, the second phase of this assessment was carried out and reported in the "Transportation Performance Objectives and Indicators Report – Phase II" (City of Ottawa, 2008b). This second phase examined the progress on the remaining TMP indicators, and provided additional analysis on some indicators from the first phase that lacked sufficient data in 2005.

For specific goals and targets that are already monitored by the City, such as those for the intensification indicators and many of the transportation indicators, the same methodology employed in the City's internal monitoring process was used in this current assessment to ensure consistency in the results.

4.4 EXAMPLES OF ACTIONS TO IMPLEMENT THE PLAN

As mentioned previously, it is beyond the scope of this project to provide a detailed account of the outputs or the actions that the City has taken to implement the Smart Growth goals of the Ottawa 20/20 OP and supporting plans. Nevertheless, it is worth briefly mentioning some examples of outputs that have been implemented by the City since the adoption of the Ottawa 20/20 OP in 2003 that may have contributed to the observed outcomes. The majority of the output examples provided below were gathered from various editions of the City's Annual Report (City of Ottawa, 2001-2012); the examples provided are not exhaustive.

The City has taken various actions since 2003 to improve transportation in Ottawa for various modes. Some examples of these actions include: developed and approved both a city-wide cycling plan and a city-wide pedestrian plan; increased the number of cycling lanes, paved shoulders and multi-use pathways; increased the number of audible pedestrian signals; moved forward with plans and assessments for the proposed light-rail project; increased transit accessibility; increased transit service along many transit routes; implemented transit priority measure in strategic areas (e.g., along Holland Avenue); and increased the number of park-and-ride spaces and lots. With regard to infrastructure provision, the City has completed a number of sewer and watermain upgrades and street rehabilitation projects (e.g., along Wellington Street West and Richmond Road), added bus lanes on the 417 in East end, and implemented expansions to the city's Transitway (bus rapid transit system). The City has taken actions to improve and increase the amount of forest and greenspace by planting numerous tree seedlings as part of a rural reforestation program, planting new trees within the urban area, adopting a tree-cutting by-law to limit the loss of tree cover, developing the Greenspace Master Plan, and increasing the amount of parkland under City-ownership.

The City also undertook an initiative to develop a comprehensive zoning by-law, which was completed in 2008. The main purpose of this comprehensive by-law is to facilitate the implementation of the policies in the 2003 OP for the amalgamated City of Ottawa, and to harmonize the zoning by-laws of all of the former municipalities. The by-law also reduces parking requirements and sets parking maximums in the vicinity of transit stations, and allows

for a greater mixing of uses (Heydorn, 2007). The City also amended existing zoning by-laws to allow the construction of secondary dwelling units on existing homes. Further, the City has completed a series of planning and design guidelines since the adoption of the 2003 OP to help carry out the vision of the plan. Some examples include the Transit-Oriented Development Guidelines, Urban Design Guidelines for High-Rise Housing, Urban Design Guideline for Low-Medium Density Infill Housing, and Urban Design Guidelines for Greenfield Neighbourhoods. The City has also developed a comprehensive City Housing Strategy that identifies strategies to address housing needs and supports the Ottawa 20/20 Smart Growth objectives. Since the adoption of the Ottawa 20/20 OP, the City has also completed over 25 Community Design Plans, an initiative introduced in the 2003 OP to ensure that the policies of the OP and land use compatibility are realized at the community scale both within the built-up area, as well as on large greenfield sites. These Community Design Plans include plans for development densities, land use distribution, housing mix, greenspace provision, and transportation and service needs.

The City has also implemented a development charges structure that encourages intensification and discourages suburban growth, by establishing three distinct development charge areas: Inside the Greenbelt, Outside the Greenbelt, and Rural Areas (refer to Figure 2). Development charges are highest in suburban areas. Some developments are even exempt from development charges all together, including: conversions; contaminated lands; non-profit housing; any development in a development charge fee zone in the core area; and within 500 metres of a light rail or Transitway station (Heydorn, 2007). Despite some efforts to facilitate intensification in Ottawa, the City has not done much to implemented policies or programs beyond the OP to specifically encourage intensification in target areas (Heydorn, 2007).

Chapter 5: Evaluation Framework

This chapter describes the details of the evaluation framework that forms the basis of the analysis carried out in Phase 3 of this research project. The evaluation framework consists of a series of indicators that are used to measure progress on the outcomes related to each of the Smart Growth goals examined in this analysis. The following subsections summarize the Smart Growth goals examined in this analysis, the indicators selected to measure the progress on each goal, as well as the data sources used to carry out this evaluation.

5.1 SMART GROWTH GOALS

Section 3.1.2 of this report listed 10 generally accepted Smart Growth goals, as determined through the review of Smart Growth literature and gathered information from well-established Smart Growth organizations in Phase 1. Due to the scope and the limited timeframe for this project, not all of these Smart Growth goals could be evaluated. As such, the following seven Smart Growth principles were selected to form the basis of the evaluative analysis in this project:

- 1. Create a range of housing options
- 2. Create compact neighbourhoods
- 3. Strengthen and encourage growth in existing communities
- 4. Strengthen the urban structure (with activity centres connected by transit)
- 5. Promote a mix of land uses
- 6. Promote a variety of transportation options
- 7. Conserve and enhance open space, agricultural land, and sensitive natural lands

These seven Smart Growth principles were selected for this analysis because they deal with physical, land use-based features, and can therefore be quantified and tracked over time with relative ease. The three goals excluded from this analysis—namely creating a sense of place, ensuring broad-scale, integrative planning, and encouraging community and stakeholder engagement (goals 8-10 in Section 3.1.2 of this report)—are far less straight forward to measure progress on. For instance, what defines a sense of place in a community is highly subjective and can mean different things to different people. Also, while it might be possible to obtain counts of the number of citizens that attend public meetings, it is much more difficult to determine whether community and stakeholder input is genuinely taken into account in decision-making processes. Furthermore, encouraging community involvement and ensuring an integrative planning approach are policy-based goals, and therefore they may be less directly influenced by planners and other City staff besides Council. Policy-based goals are also more difficult to measure than performance-based goals, such as the seven selected for this analysis.

5.2 SELECTION OF INDICATORS

To measure progress on the implementation of each of these seven Smart Growth principles, specific indicators were selected for each goal. Various factors were considered in the selection of these indicators. First off, ideas for different indicators for each of the seven Smart Growth goals were derived from the literature review conducted in Phase 1 of the project, which examined various existing studies that have sought to evaluate the outcomes of plans and policies related to Smart Growth, New Urbanism, transit-oriented development, among other evaluative studies. This was particularly helpful for identifying indicators for measuring progress on housing mix, land use mix, compact neighbourhoods, among others.

Next, the review of the Ottawa 20/20 plans conducted in Phase 2 of the research helped in identifying additional indicators that could be used in this evaluative framework, as specific targets set out in the plans were identified. This process was most helpful for identifying appropriate indicators for intensification, employment in nodal centres, transportation options, as well as greenspace and forest cover. As mentioned in Section 4.3.3 of this report, the City

already monitors progress for some of the specific targets set out in the Ottawa 20/20 plans, such as the intensification and many of the transportation indicators. For the specific indicators that are already monitored by the City, the same methodology employed in the City's internal monitoring process was used in this analysis whenever possible, to ensure consistency in the results.

Finally, data availability also played a significant role in the selection of indicators for this framework. There were some cases where indicators had to be modified slightly due to challenges with data availability. For example, the results of the 2011 National Capital Region Origin-Destination (OD) Survey were not available in time for use in this analysis; therefore, the indicators for mode split/share could not be measured for the city-wide targets, but instead screenline targets were measured using data from the City's Annual Classification and Occupancy Count Program (described further in Section 6.6). Census data presented a similar challenge in timing for the data release, and resulted in modification of indicators for employment in nodal centres, for example. Communications with a few planners at the City was instrumental in identifying alternative indicators and data sources.

The final evaluation framework consists of a total of 21 indicators. At least one indicator was selected to measure progress on each goal, although some goals have several indicators. Table 1 summarizes the indicator(s) selected to measure progress on each Smart Growth goal and lists the specific targets set out in the OP (and relevant supporting plans) for applicable indicators, as determined in Phase 2 of this project. In instances where the OP or related plans did not indicate a quantitative target for a given indicator, the qualitative goal specified in the Ottawa 20/20 plan(s) is provided. The specific source of each target is provided in Chapter 6.

TABLE 1. List of Smart Growth goals and corresponding indicators that make up the evaluation framework for this research project

GOA	al / Indicator(s)	TARGET								
Goal	Goal 1: Create a range of housing options									
1.1	Housing mix index	- Qualitative goal to increase the range of housing options before the planning horizon								
Goal	2: Create compact neighbourhoods									
2.1	Development densities in suburban areas	- Qualitative goal to accommodate new development in more compact forms before the planning horizon								
Goal	3: Strengthen and encourage growth in existin	ng communities								
3.1	Intensification share of new urban residential units	- 36% of all new urban residential units from 2007 to 2011								
3.2	Proportion of new residential units built inside the Greenbelt	- 30% of all new dwellings between 2006 and 2011								
Goal	4: Strengthen the urban structure (activity ce	ntres connected by transit)								
4.1	Share of new residential units in Target Areas	- Qualitative goal to direct residential intensification in target areas before the planning horizon								
4.2	Employment in Mixed Use & Town Centres	- At least 5000 jobs in Mixed Use Centres and 10,000 jobs in Town Centres by the planning horizon								
Goal	5: Promote a mix of land uses									
5.1	Land use mix in Mixed Use Centres	- Qualitative goal to increase land use mix in designated centres before the planning horizon								
5.2	Land use mix in Planning Subareas	- Qualitative goal to increase land use mix in the general urban area before the planning horizon								

GOAL / INDICATOR(S) (CONT'D)		TARGET								
Goal	Goal 6: Promote a variety of transportation options									
6.1	Transit mode split	 City-wide = 30% by the planning horizon Screenlines: Inner Area Cordon = 50% by the planning horizon Greenbelt Cordon = 34% by the planning horizon 								
6.2	Transit ridership per capita	- 200 rides per capita by the planning horizon								
6.3	Completion of the rapid transit network	- 100% completion by 2031								
6.4	Cycling mode share	 City-wide = 3% by the planning horizon Screenlines= TBD according to the TMP 								
6.5	City-wide cycling index	- TBD according to the TMP								
6.6	Walking mode share	 City-wide = 10% by the planning horizon Screenlines= TBD according to the TMP 								
6.7	Sidewalk coverage	- TBD according to the TMP								
6.8	Vehicle registrations	- Qualitative goal to reduce automobile dependency before the planning horizon								
6.9	Vehicle collisions with cyclists	- 30% reduction from 2003 levels by 2010								
6.10	Vehicle collisions with pedestrians	- 30% reduction from 2003 levels by 2010								
Go	al 7: Conserve and enhance open space, ag	gricultural land, and sensitive natural lands								
7.1	Access to greenspace	- Minimum of 4.0 ha of greenspace per 1000 population or approximately 16-20% of gross land area in the Urban Area by the planning horizon								
7.2	Change in area of agricultural land	- Qualitative goal to preserve agricultural land before the planning horizon								
7.3	Change in area of forest and wetlands	 Qualitative goal to preserve and protect wetlands and forests before the planning horizon 30% forest cover for the entire city by the planning horizon, pending completion of a forest strategy 								

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5.3 DATA SOURCES

The data used to carry out the analysis for each of the 21 indicators in the evaluation framework were obtained through communication with planners and other employees at the City of Ottawa, primarily from the City's Planning and Growth Management Department. A list of the data sources used to analyze each individual indicator is provided in Table 2, as well as the timeframe for which the data was obtained. Whenever possible, data was obtained for a few years prior to plan implementation in 2003 (as far back as 1995 in some cases), through to the most recent data available.

TABLE 2. List of data sources and timeframe for each indicator

INDICATOR	DATA SOURCE	Data Timeframe
Housing mix index	Subarea Household Estimates (by housing type), City of Ottawa	2001-2011
Development densities in suburban areas	Vacant Residential Land Survey (by housing type), City of Ottawa	1996-2010
Intensification share of new urban residential units	Building permits (net of demolitions on the same property), as presented in 2010 Annual Development Report, City of Ottawa	2001-2011
Proportion of new residential units built inside the Greenbelt	Building permits (net of demolitions), as presented in 2010 Annual Development Report, City of Ottawa	2001-2010
Share of new residential units in Target Areas	2000-2010	
	Employment Survey, City of Ottawa	2001, 2006, 2011
Employment in Mixed Use & Town Centres	Traffic Zone Shape File, City of Ottawa	2007
	Mixed Use Centre Boundary Shape File, City of Ottawa	Most Current
	Land Use Survey, City of Ottawa	2005 & 2010
Land use mix in Subareas and Mixed Use	Mixed Use Centre Boundary Shape File, City of Ottawa	Most Current
	Planning Subarea Boundary Shape File, City of Ottawa	2005
	Annual Classification and Occupancy Count Program data for Inner Area Cordon and Greenbelt Cordon, City of Ottawa	2003-2010
Transit mode split	"Transportation Performance Objectives and Indicators", City of Ottawa (2005): - Exhibits 4.2.2 & 4.2.5 (original source: Annual Classification and Occupancy Count Program)	1995-2002

INDICATOR (CONT'D)	DATA SOURCE	DATA Timeframe
	OC Transpo Operating Statistics, City of Ottawa	2003-2010
Transit ridership per capita	"Transportation Performance Objectives and Indicators", City of Ottawa, 2005 (Exhibit 4.2.1)	1995-2002
Completion of the rapid transit network	OC Transpo Operating Statistics, City of Ottawa	2003-2010
	Annual Classification and Occupancy Count Program data for Inner Area Cordon, City of Ottawa	2003-2010
Cycling mode share	"Transportation Performance Objectives and Indicators", City of Ottawa, 2005 (Exhibit 4.3.1; original source: Annual Classification and Occupancy Count Program)	1995-2002
City-wide cycling index	2011 City of Ottawa Cycling Index Report	1995-2011
Walking mode share	Annual Classification and Occupancy Count Program data for Central Business District Cordon, City of Ottawa	2003-2010
	"Transportation Performance Objectives and Indicators", City of Ottawa, 2005 (Exhibit 4.4.1; original source: Annual Classification and Occupancy Count Program)	1995-2002
Sidewalk coverage	Data gathered by Asset Management Branch, City of Ottawa	2003-2010
Vehicle registrations	Annual Collision Statistics Reports, City of Ottawa (Figure 1.6 & 1.4)	1995-2010
Vehicle collisions with cyclists	Annual Collision Statistics Reports, City of Ottawa (Figure 5.1 & 1.6)	1995-2010
Vehicle collisions with pedestrians	Annual Collision Statistics Reports, City of Ottawa (Figure 6.1 & 1.6)	1995-2010

INDICATOR (CONT'D)	DATA SOURCE	DATA Timeframe
	Population Estimates by Subarea, as presented in the 2010 and 2007 Annual Development Report, City of Ottawa	2005 & 2010
16-20% of gross land area	"Passive Recreation" category from the Land Use Survey, City of Ottawa	2005 & 2010
	Parks Polygon File, City of Ottawa	2005, 2010, 2012
Change in area of agricultural land	"Agriculture" category from the Land Use Survey, City of Ottawa	2005 & 2010
Change in area of forest and wetlands	"Forest", "Wetland" and "Forested Wetland" categories from the Land Use Survey, City of Ottawa	2005 & 2010

Chapter 6:

Evaluation of Plan Outcomes

The following chapter outlines the results of the quantitative analysis of trends for all 21 indicators chosen to measure progress on the seven Ottawa 20/20 Smart Growth goals examined in this research project. It is important to remember, however, that many of the goals and targets set out in the Ottawa 20/20 OP and supporting plans are long-terms goals, providing a vision through to the end of the planning horizon (to 2021 or beyond). Therefore, it is to be expected that some goals and targets will not yet be met at this time. Nevertheless, the analysis provided here will provide a good indication on the City's progress and potential toward achieving the set Smart Growth targets and goals of the Ottawa 20/20 OP.

6.1 CREATE A RANGE OF HOUSING OPTIONS

Creating a range of housing options is essential to ensuring that the city's diverse housing needs are sufficiently met. There are increasing numbers of single-parent families, "empty nesters", single-person households, among various other household structures that require a diversity of housing types to suit their needs. In addition, a diversity of housing types allows for better use of land, the accommodation of population growth in a more sustainable manner, and makes for a more interesting streetscape. This Smart Growth goal is assessed using a single indicator which examines the overall housing mix in Ottawa over time.

6.1.1 HOUSING MIX INDEX

TARGET: Qualitative goal to increase the range of housing options before the planning horizon

Although the Ottawa 20/20 OP does not provide a specific target for housing mix across the city³, housing policies in the plan seek to "address the integration of a range of housing into all neighbourhoods to meet the varied needs of all household types including families, seniors and young people" (City of Ottawa, 2003b, p. 7). To measure progress on this qualitative goal, a housing mix index that reflects the diversity of the overall housing stock by planning subarea was derived using the following entropy measure:

$Entropy = \{ -\sum [(p_i)(\ln p_i)] / (\ln k) \}$

where p_i presents the proportion of housing of a particular type in a subarea (e.g., singledetached), and k is the total number of housing types.⁴ The resulting housing mix index ranges from 0 to 1, where '0' represents absolute housing homogeneity in a subarea (a single housing type present), and '1' represents a balanced mix of housing types (heterogeneity). The City's Subarea Household Estimates data that summarizes the year-end estimated number of households by housing type for each planning subarea was used in this analysis. The timeframe examined is from the City's amalgamation in 2001 to the most recently available data in 2011.

Table 3 summarizes the resulting housing mix indices for the city's major planning subareas. Overall, Ottawa has a balanced mix of housing types that has increased slightly though steadily from 2001 to 2011, reaching a value of 0.78 in 2011. Although the increase in housing mix is quite small over the 11-year period examined (only a 0.03 increase), this indicator shows progress on the Ottawa 20/20 goal for increasing housing mix throughout the city.

Taking a closer look at the resulting housing mix index for each planning subarea reveals an increasing trend in housing diversity for all areas examined, but each at varying rates and overall

³ The Ottawa 20/20 OP only sets out specific targets for housing mix for Developing Communities with a Community Design Plan (OP policy 3.6.6.4ai).

⁴ In this analysis, k is equal to 5 since there are a total of 5 different housing types distinguished in the City's Household Estimates data: single-detached, semi-detached, townhouse, stacked townhouse, and apartment.

mix levels. Similar to the overall trend for the city as a whole, the area inside of the Greenbelt shows a similar, slight increase in housing mix over time. The current mix in this area is well balanced (heterogeneous), as it has been for the duration of the timeframe examined. The city's rural area consistently has the most homogeneous housing mix, which is to be expected since much of the housing in these areas are related to agricultural or other practices that require substantial amounts of land. Nevertheless, there appears to be a slight increase in housing mix in these rural areas, although it is not expected that these areas will ever become highly mixed.

All six of the city's suburban areas located outside the Greenbelt show a trend of increasing housing mix over time. Based on the housing mix index ranking used in Musterd & Andersson (2005),⁵ five of the six suburban areas ranked as "average heterogeneous" or "heterogeneous" as of 2010, suggesting that these areas offer an overall balanced range of housing options. Stittsville ranked as "average homogeneous" and has consistently had one of the lowest housing mix indices over the timeframe examined. Despite consistent growth in housing mix, none of the subareas experienced enough change to result in a change in mix ranking from 2001 to 2011, with the exception of Leitrim; nevertheless, all areas show positive progress.

Leitrim has experienced the most significant increase in housing mix from 2001 to 2011, starting out as completely homogeneous in 2001 and 2002 with only single-detached housing, but becoming the most highly mixed suburban area in 2011. Leitrim's resulting housing index for 2011 is as high as the 2011 score for inside the Greenbelt, suggesting that these two areas have a similar degree of housing mix (i.e., the distribution of the proportions of housing types is similar). However, it is important to note that this similarity does not imply that these two areas share the same proportion of *specific* housing types; for instance, inside the Greenbelt, 47% of overall housing stock is apartments, whereas in Leitrim, this same 47% is single-detached homes. Nevertheless, each area offers a balanced range of housing options.

⁵ The Mix Ranking description is based on the following housing mix index value breakdown used in Musterd & Andersson (2005):

^{0 =} Absolute homogeneity (a single housing type present)

^{0.01-0.25 =} homogeneous

^{0.25-0.50 =} average homogeneous

^{0.50-0.75 =} average heterogeneous

^{0.75-1.0 =} heterogeneous (highly mixed housing types)

SUBAREA	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2011 MIX Ranking*
Total Inside Greenbelt	0.74	0.74	0.74	0.74	0.74	0.74	0.74	0.75	0.75	0.75	0.75	Heterogeneous
Urban Areas Outside G	reenbelt											
Kanata	0.66	0.66	0.67	0.69	0.69	0.70	0.70	0.70	0.71	0.71	0.71	Average Heterogeneous
Stittsville	0.37	0.38	0.38	0.37	0.37	0.38	0.42	0.44	0.45	0.45	0.46	Average Homogenous
South Nepean	0.67	0.68	0.68	0.68	0.68	0.70	0.71	0.71	0.71	0.71	0.73	Average Heterogeneous
Riverside South	0.58	0.57	0.57	0.57	0.57	0.62	0.62	0.65	0.67	0.66	0.66	Average Heterogeneous
Leitrim	0.00	0.00	0.38	0.55	0.56	0.61	0.63	0.62	0.74	0.77	0.76	Heterogeneous
Orléans	0.59	0.59	0.60	0.61	0.62	0.62	0.63	0.63	0.64	0.65	0.65	Average Heterogeneous
Total Rural	0.14	0.14	0.14	0.14	0.15	0.15	0.15	0.15	0.15	0.15	0.16	Homogeneous
CITY OF OTTAWA	0.75	0.75	0.75	0.76	0.76	0.76	0.77	0.77	0.77	0.78	0.78	HETEROGENEOUS

TABLE 3. Housing mix index for the overall housing stock by planning subarea, 2001-2011

* The Mix Ranking description is based on the following housing mix index value breakdown used in Musterd & Andersson (2005):

0 = Absolute homogeneity (a single housing type present)

0.01-0.25 = homogeneous

0.25-0.50 = average homogeneous

0.50-0.75 = average heterogeneous

0.75-1.0 = heterogeneous (highly mixed housing types)

6.2 CREATE COMPACT NEIGHBOURHOODS

Smart Growth planning principles recognize that not all growth will necessarily be taken up by intensification within the existing built-up area; some degree of greenfield development will likely still occur to accommodate growth. Nevertheless, there are measures that can be taken to ensure that new development is more compact, so as to reduce the amount of greenfield land consumed by new development and to ensure that the use of more sustainable modes of transportation, such as transit and walking, are more viable. This can partly be achieved by requiring small lot sizes and setbacks, as well as encouraging the construction of fewer single-detached homes in favour of more multi-family unit housing types. This Smart Growth goal is assessed by examining changes in development densities in Ottawa's six suburban areas over the years.

6.2.1 DEVELOPMENT DENSITIES IN SUBURBAN AREAS OUTSIDE THE GREENBELT

TARGET: Qualitative goal to accommodate new development in more compact forms before the planning horizon

The Ottawa 20/20 OP recognizes the need to "[accommodate] new growth and development in a more sustainable manner utilizing compact, mixed-use built form principles, including a moderate increase in density" (City of Ottawa, 2003b, p. 9). Although no specific target is set for greenfield suburban development in general, ⁶ this statement sets a goal toward increasing the density of new development in the city, including the suburban areas located outside of the Greenbelt, to ensure more compact neighbourhoods.

⁶ The OP only sets out a density target for "Developing Communities" designated in Schedule B of the OP. The Plan requires the completion of a Community Design Plan (CDP) prior to any development being approved in a Developing Community, which will set out the planned density. According to a City of Ottawa planner, to date, little or no construction has occurred in any of the Developing Communities (with the exception of the South Barrhaven area in South Nepean where the density has exceeded the OP target). Therefore, achievement of this target is currently measured by the density approved in CDPs for Developing Communities; once these areas start being built, the City will verify that built densities follow the planned densities.

The City's Vacant Urban Residential Land Survey (VURLS) monitors the supply of vacant urban residential land in the city and captures net⁷ development densities for all new development within the urban area on an annual basis. Net development densities are calculated by dividing the sum of new units built by the sum of hectares developed (i.e., the aggregate lot area for these new units) for a given year. Data in the VURLS are categorized by planning subarea. For the six urban subareas located outside the Greenbelt, the VURLS captures primarily "greenfield" development on an annual basis.⁸

This indicator uses data from the VURLS to examine the overall net densities for all new residential units constructed in the urban areas located outside the Greenbelt in a given year, from 1996 to 2010. Examining the overall trend of development densities over time provides a good indication of whether densities of new developments in the city's suburban areas have been increasing, to ensure more compact neighbourhoods. Figure 4 shows the aggregate development density for all new residential units constructed in suburban areas outside the Greenbelt in a given year, from 1996 to 2010. The results reveal an overall increasing trend in suburban development densities. For the timeframe examined, the aggregate development density for all six subareas located outside the Greenbelt ranges from a low of 24.4 units per net ha in 1998 to a high of 36.4 units per net ha in 2010. Increases in suburban development densities over time have been primarily the result of two factors: 1) there have been greater numbers of higher density housing types in the mix of new development over the years; and 2) less land is being used for specific housing types (e.g., single-detached homes are being built on smaller lots).

⁷ "Net" density refers to land that is exclusively used for residential purposes (i.e., building lots including lanes and parking areas internal to developments, but excluding public streets, rights-of-way and all non-residential uses).

⁸ According to a planner at the City of Ottawa, VURLS densities could include larger intensification parcels (0.8 net ha in size or more); however, for suburban areas, the densities captured by the VURLS provide an approximation of primarily greenfield density, especially for lower-density unit types.



FIGURE 4. Aggregate development density for all new residential units constructed in a given year in all six suburban areas outside the Greenbelt, 1996-2010

Figure 5 illustrates the trend in development density for all new residential development in each of the city's six suburban areas located outside the Greenbelt, from 1996 to 2010. The results reveal a positive trend for increasing development densities in all six suburban areas over the examined timeframe. In most of these suburban areas, development densities have ranged from a low of 20-25 units per net ha during the early 2000s, to a high of 30-44 units per net ha in 2010. For the 15-year timeframe examined here, four of the six suburban areas—namely Kanata, Orleans, South Nepean and Leitrim—recorded their highest overall development densities in 2010. Stittsville consistently has the lowest overall annual development density of all of the subareas outside the Greenbelt.



FIGURE 5. Development densities for all new residential units constructed in a given year in each of the city's six suburban areas outside the Greenbelt, 1996-2010

6.3 STRENGTHEN AND ENCOURAGE GROWTH IN EXISTING COMMUNITIES

Directing growth in existing communities ensures more efficient investment in public infrastructure, while also reducing development pressures on greenfield land. Although policy 2.2.3.3 in the original 2003 Ottawa 20/20 OP noted that "the City supports intensification and infill development throughout the urban area", no specific intensification targets were set at that time. Changes to Provincial legislation since the Ottawa 20/20 OP was adopted now require municipalities to set intensification targets. As a result, amendments have been made to the OP to include specific targets for residential intensification in the urban area. Hence, intensification targets for this analysis are derived from the 2011 consolidation of the OP.

6.3.1 INTENSIFICATION SHARE OF NEW URBAN RESIDENTIAL UNITS

***** TARGET: 36% of all new urban residential units from 2007 to 2011, inclusively

Policy 2.2.2.5 in the 2011 consolidation of the Ottawa OP includes a rolling target for residential intensification in the urban area from 2007 to 2031. The target share of residential intensification in the urban area for the period from 2007 to 2011, inclusively, is set at 36%. Progress on this intensification target is reported annually in the City's Annual Development Report, which tracks and analyzes demographic, economic and development activity in the city over time, reporting against OP policy objectives when applicable (City of Ottawa, 2011a). The intensification share of new residential units is the total number of intensification units in the urban area as a proportion of the total number of new residential units constructed in the urban area during a given year. The City uses building permits⁹ to derive these figures, and the results for intensification share are presented net of demolitions on the same property.

⁹ According to the City's 2010 Annual Development Report, building permits are the most accurate measure of housing activity in the City since CMHC Housing Starts do not include all forms of new dwelling units (i.e., does not capture apartments in houses, new units added to existing multi-residential buildings, etc.), and therefore underestimate the number of intensification units.

Table 4 shows that the proportion of new residential units (net of demolitions on the same property) in the urban area classified as intensification annually from the City's amalgamation in 2001 to the most recent data in 2011. During this timeframe, the lowest observed intensification rate was 27.1% in 2001, while the highest were in 2011 and 2010 at 45.2% and 43.8%, respectively. The intensification rate between 2002 and 2009 fluctuated between 30-40%, with the second lowest rate occurring in 2009 with 30.2% of new residential units being classified as intensification.

Between 2007 and 2011, an average¹⁰ of 39.2% of all new residential units constructed in the city's urban area was classified as intensification. Therefore, the City has met and exceeded the set target for this timeframe by 3.2%. The next rolling target for residential intensification in the urban area is 38% of all new residential development from 2012 to 2016. The trend examined here for 2007-2011 shows great potential for the City to meet this next intensification target. Given the fluctuation in intensification rates over the years, however, it will be important to continue to monitor the intensification share of new dwelling units on an annual basis to ensure that rates do not fall far below the target.

¹⁰ Average is weighted by dividing the sum of all urban intensification units built during the observed timeframe by the sum of all urban units built during the time period.

YEAR	INTENSIFICATION UNITS*	TOTAL URBAN Units*	% INTENSIFICATION OF URBAN TOTAL
2001	1,506	5,551	27.1%
2002	2,599	7,091	36.7%
2003	2,237	5,953	37.6%
2004	2,323	6,740	34.5%
2005	1,545	4,551	33.9%
2006	1,734	5,066	34.2%
2007	2,877	7,227	39.8%
2008	2,339	6,521	35.9%
2009	1,609	5,333	30.2%
2010	2,676	6,116	43.8%
2011	2,881	6,372	45.2%
Total, 2007-2011	12,382	31,569	39.2%

TABLE 4. Intensification share of new residential units in the Urban Area, 2001-2011

* Figures are net of demolitions on the same lot

Source: City of Ottawa building permits; adapted from Table 25 in 2010 ADR + additional data for 2011 from City Planner

6.3.2 PROPORTION OF NEW RESIDENTIAL UNITS BUILT INSIDE GREENBELT

***** *TARGET: 30% of all new dwellings between 2006 and 2011, inclusively*

According to the City's Detailed Land Use Survey reports, vacant land represented just under 5% of the total land inside the Greenbelt (864 ha) in 2005, and has dropped to less than 4% (only 724 ha) in 2010. Further, the remaining vacant land inside the Greenbelt is concentrated in just a few areas: Canadian Forces Base (CFB) Rockcliffe, Lebreton Flats, Bayview and vacant employment land in the southeast. As a result, all new residential development that occurs inside the Greenbelt is considered to be a form of intensification, according to City planners. Goals that seek to increase or sustain residential development inside the Greenbelt are therefore supportive of the City's intensification goals.

Figure 2.2 in the 2011 consolidation of the Ottawa OP assumes that 30% of all new households constructed in Ottawa between 2006 and 2011, inclusively, will be located inside the Greenbelt

(City of Ottawa, 2011b). While the intensification target discussed in Section 6.3.1 above focused on intensification as a share of urban development, this target measures the proportion of housing development inside the Greenbelt relative to all new residential development, both urban and rural. Progress on this target is also reported in the City's Annual Development Report (described in Section 6.3.1), the results of which are used to report on this indicator herein. As with the previous indicator, the City's building permits are used to determine the number of new units constructed each year. The results for the total proportion of new residential development inside and outside of the Greenbelt are presented net of all demolitions across the city for each year.

Figure 6 illustrates the proportion of new residential units (net of demolitions) constructed inside and outside the Greenbelt from the earliest available data in 2001 to the most recent data in 2010. During this timeframe, the proportion of new residential development located inside the Greenbelt was lowest in 2009 at 22.1%, and peaked in 2002 at 37.0%. From 2006 to 2010, 28% of all new residential units (net of demolitions) were constructed inside the Greenbelt, only 2% below the OP target. Therefore, it is very likely that this target will be met successfully by 2011 if the current trend of residential development inside versus outside of the greenbelt continues. Progress on this target should be measured once the 2011 data are available, to ensure that the target is indeed met (this will likely be done in the City's next Annual Development Report).

Figure 2.2 of the 2011 OP consolidation also projects that 35% of all new residential development between 2011 and 2021 will be located inside the Greenbelt. Given the decrease in available land inside the Greenbelt over time, further residential infill and other intensification measures will be necessary to ensure that the City's subsequent targets for development inside the Greenbelt are met.



Source: City of Ottawa Building permits; adapted from ADR 2010 pg. 15

FIGURE 6. New housing inside and outside the Greenbelt, 2001-2010

6.4 STRENGTHEN THE URBAN STRUCTURE

A strong urban structure is one which comprises a series of activity centres characterized by a variety of employment and housing options that are well connected to one another, and other important parts of the city, by efficient transit services. These activity centres are typically designated nodal centres where both residential and non-residential (i.e., employment) growth is targeted. An urban structure of this kind can help to reduce the need for travel by allowing individuals to live closer to their jobs and amenities, and can encourage the use of public transit. This Smart Growth goal is assessed using two indicators: one that examines residential growth in target areas and one that examines employment growth in designated centres.

6.4.1 SHARE OF NEW RESIDENTIAL UNITS IN TARGET AREAS

TARGET: Qualitative goal to direct residential intensification in target areas before the planning horizon

Policy 2.2.2.4 in the 2011 consolidation of the OP has identified intensification "target areas" throughout the city, with the intention of directing residential growth to areas with high levels of transit service located close to employment opportunities (City of Ottawa, 2011b). There are six designated target area categories: the Central Area, Mainstreets, Mixed Use Centres, Town Centres, the vicinity (600 m) of Rapid Transit Stations, and Enterprise Areas.

The City tracks the number of new residential units constructed in these six designated areas in the Annual Development Report (described in Section 6.3.1). Figures are based on issued building permits for a given year, net of demolitions on the same lot. Data for new development in target areas are available from the year 2000 through to 2010 thus far. This indicator uses the data from Annual Development Reports to examine the number of new residential units built within each OP designated target area over time, as a proportion of all new units in the city.

Table 5 shows the annual number of new residential units within each target area category from 2000 to 2010. During the 11-year period examined, a total of 12,271 new residential units were constructed in OP designated target areas. Rapid Transit Stations and Mainstreets are the target areas that have received the most new residential development during this period, with a total of 5,338 and 3,199 new units respectively. The total number of new units constructed in all target areas combined varies over the years, ranging from a high of 1,625 units in 2002 to a low of 480 units in 2005. As illustrated in Figure 7, however, the total number of new residential units constructed in the city also varies from year to year, ranging from a high of 7,964 units in 2002 to a low of 5,172 units in 2005.

OP TARGET Area	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	TOTAL
Central Area	0	157	468	532	440	0	469	353	246	166	47	2,878
Mainstreets	255	27	299	394	349	262	101	344	399	286	483	3,199
Mixed-Use Centres	43	191	175	159	199	130	3	78	205	35	110	1,328
Rapid Transit Stations	491	383	616	596	563	144	141	545	623	345	891	5,338
Town Centres	125	250	260	176	88	29	60	158	0	0	146	1,292
Enterprise Areas	0	0	10	31	8	35	19	275	225	250	271	1,124
TOTAL UNITS IN TARGET AREAS*	884	824	1,625	1,423	1,361	480	713	1,534	1,044	786	1,597	12,271

TABLE 5. New residential units by Official Plan designated Target Area, 2000-2010

* Removes double-counting of units that are included in more than one category.

Source: City of Ottawa building permits; ADR various years

Looking at the percent share of new units built in OP target areas relative to all new units in the city (Figure 7) it is evident that, despite the year-to-year fluctuations in new unit construction, there is an overall increasing trend in the proportion of new residential units located in target areas. The proportion of new residential units constructed in target areas during the period examined ranges from 9.5% in 2005 to 24.5% in 2010. The target areas accounted for an average of 24.1% of the city's new residential construction over the 11-year period from 2000-2010. Although there is no specific target for this indicator, the share of residential development in target areas that are well served by transit and within close proximity to jobs is growing somewhat.



^{*} Removes double-counting of units that are included in more than one category. ** Calculated using figures net of demolitions, except for years 2000-2002 are not net of demolitions

FIGURE 7. New residential units in Official Plan designated Target Areas, 2000-2010

6.4.2 EMPLOYMENT IN MIXED USE & TOWN CENTRES

TARGET: At least 5000 jobs in Mixed Use Centres and 10,000 jobs in Town Centres by the planning horizon

Policy 3.6.2.2 of the 2003 OP¹¹ sets employment targets of at least 5,000 jobs in designated Mixed Use Centres and 10,000 jobs in Mixed Use Centres that are designated as Town Centres by the planning horizon (City of Ottawa, 2003b). Schedule B of the OP identifies a total of 14 designated Mixed Use Centres, which are subject to these employment targets, three of which

¹¹ Updated to policy 3.6.2.3 in the 2011 consolidation of the OP

are further designated as "Town Centres" (refer to Figure A2 in the Appendix for a map of the designated Mixed Use Centres).

To measure progress on this OP target, data from the City's Employment Survey was used. This survey gathers estimates of employment levels by attempting to contact (by telephone) every employer within the city of Ottawa's limits, based on a database of employers provided by a third party organization. Estimates of federal employment are derived from the National Capital Region Federal Employment Survey. The City's Employment Survey may not establish 100% employment coverage since: 1) the survey only contacts only employers listed in the phone listings, which may exclude self-employed individuals, and 2) the survey only focuses on market activities that add value through production or distribution of goods or services, and therefore excludes informal or "underground" economic activity (City of Ottawa, 2007).

Given the timeline of interest for this research project, the results of the 2001, 2006 and 2011 Employment Surveys were used to observe the change in the number of jobs in each centre. The City releases a report summarizing the results of each employment survey; however, given the time constraints of this project, the 2011 report was not available in time. Therefore, data summarized at the Traffic Zone level was used to determine the estimated number of jobs in each Mixed Use and Town Centre using GIS software. This methodology was employed for all three years examined (2001, 2006 and 2011) to ensure consistency in the data presented herein.

The boundaries of the designated Mixed Use Centres and Traffic Zones do not line up perfectly (i.e., Traffic Zones often extend beyond the Mixed Use Centre boundary); therefore, a planner at the City of Ottawa assisted in identifying the Traffic Zones that best represented employment level in each Mixed Use Centre (refer to Table A2 in the Appendix for a list of the Traffic Zones used to represent each Mixed Use Centre). The results derived for 2001 and 2006 using this alternative methodology were compared to the results presented in the reports for the 2001 and 2006 Employment Survey. It was found that the methodology used in this analysis provided nearly the same results as those reported in the Employment Survey reports, and had no effect on whether or not a Mixed Use Centre was determined to have met the OP target. Notes in the

figures presenting the results of this analysis indicate the areas for which discrepancies of 100 jobs or more may exist.

Given that specific employment targets are defined for regular Mixed Use Centres and those defined as Town Centres, this analysis presents the results for each group separately. Two of the designated Mixed Use Centres—namely Lees and Mer Bleue—were excluded from this analysis since they have so few jobs (less than 10 jobs and less than 100 jobs, respectively, as of 2006). Therefore, these two areas are certainly far from meeting the OP target for designated Mixed Use Centres.

Figures 8 and 9 below summarizes the estimated number of jobs in each designated Mixed Use and Town Centre in Ottawa for 2001, 2006 and 2011. The results for Mixed Use Centres (Figure 8) are rather mixed. The average number of jobs for all nine Mixed Use Centres examined in this analysis exceeds the 5,000 job target for all three years examined, with an increase in the average number of jobs over time. To date, six of the nine centres shown here¹² have far exceeded the OP target of 5,000 jobs in Mixed Use Centres. Tunney's Pasture is the centre with the most number of jobs by far, owing to the presence of a large governmental complex at this location. Of the six centres that exceeded the OP target, Baseline-Woodroffe, Bayview-Carling-Preston, Trainlands and Tunney's Pasture have experienced large increases in the number of jobs during the timeframe examined, while Blair and Confederation Heights have seen relatively little growth.

In addition to the two Mixed Use Centres that were excluded from this analysis due to a lack of jobs (Lees and Mer Bleue), three other Mixed Use Centres—Billings Bride, Cyrville and Kanata West— have not met the OP target for jobs to date. Although the OP target sets a long-term goal to the planning horizon, these areas have experienced relatively little job growth compared to some other Mixed Use Centres during the examined timeframe. Therefore, if these three Mixed Use Centres are to meet the OP target in the long-term, there will need to be many more jobs added to these areas per year.

¹² Given that the Mer Bleue and Lees Mixed Use Centres were excluded from this analysis for having too few jobs, only six of a total of 11 mixed use centres have reached the OP target to date.



*Likely overestimated but does not affect whether target is met or not **Likely underestimated but does not affect whether target is met or not

FIGURE 8. Estimated number of jobs in designated Mixed-Use Centres, 2001, 2006 & 2011

The results for Town Centres, with a target of 10,000 jobs, are much less encouraging. The average number of jobs for three Town Centres is well below the 10,000 job target for all three years examined (Figure 9), although there is a slight increase in the average number of jobs over time. None of the three designated Town Centres has reached or even come close to reaching the OP employment target to date. Of these three centres, Kanata Town Centre has the most jobs up to now, followed by Orleans Town Centre and then South Nepean Town Centre. Much more work will be required in order to ensure that the employment targets for these Town Centres are met in the future as the OP continues to be carried out.



**Likely underestimated but does not affect whether target is met or not

FIGURE 9. Estimated number of jobs in designated Town Centres, 2001, 2006 & 2011

6.5 PROMOTE A MIX OF LAND USES

The Ottawa 20/20 OP notes the importance of mixing land uses throughout the plan, indicating that it is an essential component of more complete, walkable and livable neighbourhoods (City of Ottawa, 2003b). The following two indicators examine the mix of land uses in specific areas of the city using the results of the City's Land Use Survey for 2005 and 2010. Analysis of the Land Use Survey for earlier years (1995 and 2000 in particular) was not possible due to substantial differences in the methodology used to prepare these earlier surveys. The City's Land Use Survey is very comprehensive, as it includes over 30 land use categories and collects data at the property parcel level. In general, developed lands in the urban area and rural villages are classified using property and structure information obtained from assessment data and the

Ontario land registry database (POLARIS), while undeveloped lands (such as forests, fields and other natural spaces) are categorized using air photos, field checks, among other sources (City of Ottawa, 2012).

Land use mix is challenging to measure, as an appropriate "mix" of land uses can mean many different things. The City defines mixed use as "a variety of uses in a building or a community in close proximity, possibly including housing, recreational, commercial, institutional, or other employment uses" (City of Ottawa, 2003b, glossary, p.254). As such, the general land use categories derived for this analysis are: residential, employment and economy, commercial, and recreation (refer to Table A3 in the Appendix for the specific categories from the City's Land Use Survey used in this analysis). The general land use categories derived for this analysis, which effectively represent the OP's focus on mixing land uses to ensure complete, livable communities.

To carry out this analysis, a land use mix index was derived using the entropy measure:

Entropy = { - $\sum [(p_i)(\ln p_i)]/(\ln k)$ }

where p_i represents the proportion of each land use type in a subarea (e.g., residential), and k is the number of land uses categories.¹³ The resulting land use mix index ranges from 0 to 1, where '0' represents absolute land use homogeneity in a given area (a single land use present), and '1' represents a balanced mix of land use types within a given area (heterogeneity). The following subsections summarize the results of this analysis in the City's designated Mixed Use Centres and major planning subareas.

¹³ In this analysis, k is equal to 4 since there are a total of 4 different land use types considered in this analysis: residential, commercial, employment and economy, and recreational.

6.5.1 LAND USE MIX INDEX BY DESIGNATED MIXED USE CENTRE

TARGET: Qualitative goal to increase land use mix in designated centres before the planning horizon

Although the Ottawa 20/20 OP does not indicate a specific target for land use mix in designated Mixed Use Centres, the City recognizes that "additional development and a greater mix of uses around and within these locations will make more effective use of rapid-transit and increase the range of services available to employees and nearby residents" (City of Ottawa, 2003b, p. 19). Therefore, as their name suggests, the OP sets a qualitative goal to increase land use mix within designated Mixed Use Centres over time.

The results of the analysis for the mix of land uses in the City's 14 designated Mixed Use Centres in 2005 and 2010 are summarized in Table 6. The average index for all Mixed Use Centres shows an encouraging 14.2% increase in land use mix between 2005 and 2010. Based on the mix index ranking scheme used in Musterd & Andersson (2005),¹⁴ the average ranking for all Mixed Use Centres as of 2010 is "Heterogeneous", suggesting that, on average, the designated Mixed Use Centres have a balance mix of land uses.

Examining the trends for each specific Mixed Use Centre reveals that, 10 of the City's 14 designated centres experienced an increase in land use mix between 2005 and 2010 (refer to Table 6). Mer Bleue, Lees and Kanata West experienced the most substantial increases in land use mix between 2005 and 2010, and were the only centres to experience a large enough increase to change the overall land use mix ranking during this time. The large increase in land use mix in Mer Bleue is primarily due to the introduction of some industrial activity (classified in this analysis as employment and economic activities) in this centre on previously vacant land. It is

¹⁴ The Mix Ranking description is based on the following mix index value breakdown used in Musterd & Andersson (2005):

^{0 =} Absolute homogeneity (a single land use type present)

^{0.01-0.25 =} homogeneous

^{0.25-0.50 =} average homogeneous

^{0.50-0.75 =} average heterogeneous

^{0.75-1.0 =} heterogeneous (highly mixed land use)

important to note however, that these land uses only account for approximately 10 ha of the total 142 ha of land in the Mer Bleue centre;¹⁵ the majority of the land in this centre is still classified as vacant since the area is only just beginning to be built up. The increase in land use mix at Lees is also due to an increase in the proportion of employment and economic activity (the introduction of post-secondary institutional activities on 6.5 ha of previously vacant land). The increase in Kanata West is primarily due to significant increases in the proportion of residential and commercial land uses between 2005 and 2010.

As of 2010, 13 of the City's 14 Mixed Use Centres ranked as "heterogeneous" or "average heterogeneous", based on the four general "live, work, shop, play" land use categories used in this analysis. Confederation Heights is the only designated centre that ranks as average homogeneous, given that this centre is dominated by employment and economic activities with some recreational space, but little to no residential or commercial activities. Further, Confederation Heights is the only designated Mixed Use Centre to experience a substantial decrease in land mix between 2005 and 2010; this appears to be due to further loss in the proportion of recreation activities to employment and economic activities during this time period. A few other Mixed Use Centres experienced some decrease in land use mix between 2005 and 2010: Baseline-Woodroffe, Cyrville and a slight decrease in Kanata Town Centre. The mix decrease in these three centres was not enough to change the overall mix ranking; nevertheless, these centres should be monitored in the future to ensure further decrease in land use mix is avoided.

Overall, the results for designated Mixed Use Centres are in line with the goals of the Ottawa 20/20 OP, since 13 of the 14 centres rank as having some form of heterogeneity, and 10 of the 14 centres have experienced further increases in land use mix between 2005 and 2010.

¹⁵ Recall from the Methodology that the area of land considered in this analysis is only the built-up areas with residential, commercial, employment and economic and recreational land uses. Portions of land that have yet to be built up, as well as natural features are excluded from this analysis, since the focus is on the mix of "live, work, shop, play" land uses.

MIXED USE	2	2005 Mix	2	% CHANGE	
Centre	INDEX	RANKING*	INDEX	RANKING	2005-2010
Baseline-Woodroffe	0.896	Heterogeneous	0.827	Heterogeneous	-7.6%
Billings Bridge	0.755	Heterogeneous	0.762	Heterogeneous	0.9%
Blair	0.597	Average Heterogeneous	0.632	Average Heterogeneous	5.9%
Bayview-Carling- Preston	0.851	Heterogeneous	0.869	Heterogeneous	2.0%
Confederation Heights	0.342	Average Homogeneous	0.281	Average Homogeneous	-17.8%
Cyrville	0.879	Heterogeneous	0.807	Heterogeneous	-8.2%
Kanata West	0.578	Average Heterogeneous	0.940	Heterogeneous	62.8%
Lees	0.433	Average Homogeneous	0.720	Average Heterogeneous	66.4%
Mer Bleue	0.141	Homogeneous	0.565	Average Heterogeneous	302.0%
Trainlands	0.753	Heterogeneous	0.977	Heterogeneous	29.9%
Tunney's Pasture 0.505		Average Heterogeneous	0.660	Average Heterogeneous	30.7%
Kanata Town Centre	ata Town Centre 0.933 Heterogeneous		0.910	Heterogeneous	-2.4%
Orleans Town Centre	0.686	Average Heterogeneous	0.689	Average Heterogeneous	0.4%
South Nepean Town Centre	0.814	Heterogeneous	0.824	Heterogeneous	1.2%
AVERAGE FOR ALL Mixed Use Centres	0.654	Average Heterogeneous	0.747	HETEROGENEOUS	14.2%

TABLE 6. Land use mix index for each designated Mixed Use Centre, 2005 & 2010

* The Mix Ranking description is based on the following mix index value breakdown used in Musterd & Andersson (2005): 0 = A healute homogeneity (a single lond use time present)

0 = Absolute homogeneity (a single land use type present)

0.01-0.25 = homogeneous

0.25-0.50 = average homogeneous

0.50-0.75 = average heterogeneous

0.75-1.00 = heterogeneous (highly mixed land use)
6.5.2 LAND USE MIX INDEX BY PLANNING SUBAREA

TARGET: Qualitative goal to increase land use mix in the general urban area before the planning horizon

The Ottawa 20/20 OP states that "liveability is addressed by accommodating new growth and development in a more sustainable manner utilizing compact, mixed-use built form principles" (City of Ottawa, 2003b, p. 9). Although more intensive mixed use development is targeted in designated Mixed Use Centres, as discussed in Section 6.5.1 above, the OP seeks to allow an appropriate level of land use mix throughout the urban area to ensure that communities are complete and livable. To measure progress on this qualitative goal, the same analysis for land use mix was carried out for each of the city's major urban subareas, using the results of the 2005 and 2010 Land Use Survey.

The results of this analysis are illustrated in Table 7. Progress on this goal at the subarea level is also quite good, as the average land use mix for all urban subareas experienced a 1.4 % increase between 2005 and 2010. Nearly all of the subareas examined (six out of seven) saw an increase in land use mix between 2005 and 2010. The only exception, South Nepean located outside the Greenbelt, saw a 2.6% decrease in land use mix between 2005 and 2010 due to a further increase in the proportion of residential uses, the dominant land use type in this area. Nevertheless, this decrease was not enough to change the overall mix ranking of the subarea (remains "Average Heterogeneous" in both 2005 and 2010).

The land use mix for the area inside the Greenbelt experienced little change between 2005 and 2010, likely due to an already high land use mix index and a lack of vacant land for new uses; this area maintains the highest land use mix among all of the planning subareas. In terms of the suburban areas outside the Greenbelt, Kanata experienced little change in land use mix between 2005 and 2010 (0.3%), but remains the most highly mixed of all of the suburban areas outside the Greenbelt. Stittsville, Riverside South, Leitrim and Orleans also experienced increases in land use mix between 2005 and 2010 ranging between 2.4% and 4.1% increases. This increase in land use mix, however, did not affect the land use ranking between 2005 and 2010, except for in

Leitrim which increased slightly from "Average Heterogeneous" in 2005 to "Heterogeneous" in 2010.

As of the 2010 Land Use Survey results, all seven subareas examined here ranked as either "Average Heterogeneous" or "Heterogeneous". Overall, the land use mix results for the city's planning subareas are in line with the goals of the Ottawa 20/20 OP, and show potential for further increase in land use mix over time as long as the goals of the OP remain a clear focus as these areas continue to be built out and intensified.

 TABLE 7. Land use mix index for each planning subarea in the Urban Area, 2005 & 2010

Planning	2005 MIX		2010 MIX		% CHANGE
SUBAREA	INDEX	RANKING*	INDEX	RANKING	2005-2010
Total Inside Greenbelt	0.856	Heterogeneous	0.858	Heterogeneous	0.3%
Urban Areas Outside Greenbelt					
Kanata	0.847	Heterogeneous	0.850	Heterogeneous	0.3%
Stittsville	0.655	Average Heterogeneous	0.682	Average Heterogeneous	4.1%
South Nepean	0.727	Average Heterogeneous	0.708	Average Heterogeneous	-2.6%
Riverside South	0.589	Average Heterogeneous	0.609	Average Heterogeneous	3.4%
Leitrim	0.739	Heterogeneous	0.757	Heterogeneous	2.4%
Orleans	0.746	Average Heterogeneous	0.770	Average Heterogeneous	3.2%
AVERAGE FOR ALL URBAN SUBAREAS	0.737	Average Heterogeneous	0.748	Average Heterogeneous	1.4%

* The Mix Ranking description is based on the following mix index value breakdown used in Musterd & Andersson (2005):

0 = Absolute homogeneity (a single land use type present)

0.01-0.25 = homogeneous

0.25-0.50 = average homogeneous

0.50-0.75 = average heterogeneous

0.75-1.00 = heterogeneous (highly mixed land use)

6.6 PROMOTE A VARIETY OF TRANSPORTATION OPTIONS

A key focus of Smart Growth is to provide a variety of transportation options, with the goal of reducing automobile dependency. As the city's population continues to grow, the use of public transit and active modes of transportation will become more and more important as a means of accommodating increased travel demand, while helping to reduce both pollution and the need for increased road infrastructure. A variety of indicators were used to track progress on this goal. These indicators touch on public transit, walking and cycling, as well as assessing the dependence on the automobile. It should be noted that most of the indicators and targets in this section are derived from the comprehensive performance monitoring framework set out in Annex C of the City's 2003 TMP, a key supporting plan for the Ottawa 20/20 OP.

6.6.1 TRANSIT MODE SPLIT

- ***** *TARGET*:
 - City-wide: 30% by the planning horizon
 - Screenlines:
 - Inner Area Cordon = 50% by the planning horizon
 - Greenbelt Cordon = 34% by the planning horizon

Section 2.3.1 of the 2003 Ottawa 20/20 OP states that "increasing the percentage of trips by transit...to about 30 per cent by 2021 is crucial to meet growing travel needs" (City of Ottawa, 2003b, p. 23).¹⁶ The City's TMP identifies transit mode split,¹⁷ the amount of trips made by public transit as a proportion of all motorized travel, as a performance indicator to measure progress on this goal (City of Ottawa, 2003c). Typically, data from the National Capital Region OD Survey is used to track progress on this city-wide target. Unfortunately, the results of the 2011 OD Survey were not available in time for use in this analysis (expected date of release was

¹⁶ In the 2011 consolidation of the OP, the transit target remains the same, but the planning period has been extended to 2031.

¹⁷ Transit mode *split* is the number of transit trips as a function of all *motorized* trips; this is different from transit mode *share* which is the number of transit trips as a proportion of *all* trips by all modes. Transit mode split is chosen for this analysis because it is the indicator specified in the City's TMP.

a few months following the completion date for this project). Therefore, progress on the citywide target of 30% could not be evaluated in this analysis.

The 2003 TMP, however, also identifies specific screenline¹⁸ targets for transit mode split:¹⁹ 50% by 2021 for the Inner Area Cordon²⁰ (Rideau River east & south and CPR screenlines), and 34% by 2021 for the Greenbelt Cordon (Green's Creek, Leitrim, Fallowfield, and Eagleson screenlines).²¹ The screenline mode split targets set out in the TMP are generally higher targets than the 30% city-wide target, since screenlines tend to capture travel demand from the urban core to outlying areas, and a higher quality of transit can be provided to these trips than to trips moving from one suburb to another for instance (City of Ottawa, 2003c). Furthermore, the screenline counts collect trends for mainly commuter traffic. Nevertheless, the annual screenline counts provide a good opportunity to monitor change in transit mode split when the OD Survey results are not yet available.

To measure progress toward meeting the set screenline mode split targets, the City's internal monitoring report for transportation indicators, "Transportation Performance Objectives and Indicators Report- Phase I" (City of Ottawa, 2005), uses annual screenline count data. Screenline traffic count data are collected through the City's Annual Classification and Occupancy Count Program, which collects traffic volume, vehicle type and number of persons within each mode group, at individual counting stations along strategic travel corridors throughout the region (refer to Screenline Map in the Appendix). Given the large number of screenlines across the city, not all of them can be counted each year; therefore, years with missing data in the figures below indicate that the screenline was not counted in a given year. Traffic counts are generally carried

¹⁸ A screenline is an imaginary line drawn across major transportation facilities in a corridor, typically following a feature such as a river or railway that has limited crossing points. Refer to Screenline Map in the Appendix (Figure A1).

¹⁹ These screenline mode split targets were introduced in the OP itself as of the 2007 consolidation of the plan (refer to Figure 2.4 in the 2007 consolidation of the OP).

²⁰ A cordon is a screenline or group of screenlines that contains an area of interest. This analysis used cordons to examine all travel to and from the Central Area, to and from the Inner Area, and to and from lands on either side of the Greenbelt. (Source, TMP, 2003)

²¹ These targets were revised in the 2008 TMP to the following: 51% by 2031 for the Inner Area Cordon and 32% by 2031 for the Greenbelt Cordon. The 2003 target values are used in this evaluation.

out during the spring or early summer. Results are based on observations recorded in 15-minute intervals for 7:00 am to 7:00 pm. Following the methodology used in this City's internal monitoring report, the specific data required for this analysis was the total number of "Auto Person Trips" and total number of "Transit Trips", for the afternoon peak hour and peak direction (outbound), for both the Inner Area Cordon and Greenbelt Cordon.

Figures 10 and 11 show the afternoon peak hour and peak direction transit mode split, for the Inner Area Cordon and the Greenbelt Cordon, respectively. Blank fields indicate that the screenlines for the area of interest were not counted in the given year. Count results for the Inner Area Cordon are reflective of transit use within the city's core, whereas count results for the Greenbelt Cordon are reflective of transit use from the city's suburban and rural areas located outside the Greenbelt into the city's urban area within the Greenbelt.

The results for the Inner Area Cordon in Figure 10 reveal a strong positive overall trend of increasing transit mode split from 1996 to 2010. Although the target mode split of 50% for the Inner Area Cordon is a long-term target for 2021(now 51 % by 2031 in the revised 2008 TMP), this target has already almost been met in 2008 and 2010, with observed transit mode splits of 43% and 39% respectively. This trend suggests that commuters leaving the city's core area during the afternoon peak are well served by transit routes. Based on the resulting trend line in Figure 10, if current mode split trends persist, it is certain that the target for transit mode split across the Inner Area Cordon will be met and even possibly exceeded by 2021.



FIGURE 10. Mode split for transit for the Inner Area Cordon, PM peak hour, outbound direction, 1995-2010²²

The results for the Greenbelt Cordon in Figure 11 also reveal an overall trend of increasing transit mode split from 1996 to 2010. The observed transit mode split during this timeframe ranges from 11% to 21%. The transit mode split across the Greenbelt reached an observed level of 20% in 2010, still 14% below the targeted 34%. Although the target mode split for the Greenbelt Cordon is a long-term target for 2021(now 32% by 2031 in the revised 2008 TMP), the trend line in Figure 11 is still not enough to meet this target by either 2021 or 2031. Therefore, additional growth in transit ridership to and from existing and planned communities outside the Greenbelt Cordon is needed to ensure that the target transit mode split is achieved by the planning horizon. With various transit route improvements planned across the Greenbelt in

²² The last time traffic counts were conducted at the Highway 417 at Parkdale count location was in 2006. There were 5,380 peak hour auto person trips counted at this station in 2006. Therefore, auto person trips for 2008 and 2010 are adjusted to account for estimated vehicle traffic at this count station, assuming a 1% annual growth rate in auto trips at this station, as advised by City of Ottawa staff. Transit trips did not have to be adjusted since this count station was located on a highway where transit counts did not take place.

the coming years, there is potential for the transit mode split target across the Greenbelt to be met in the long run, especially given the trend toward increasing transit mode split over the examined timeframe.



FIGURE 11. Transit mode split for the Greenbelt Cordon, PM peak hour, outbound direction, 1995-2010

The screenline count results for transit mode split across the Inner Area Cordon and the Greenbelt Cordon show different trends, although transit mode split has been increasing across both Cordons between 1996 and 2010. When the 2011 OD data is available, progress on the city-wide target of 30% for mode split should be measured to get an overall sense of the transit mode split for the entire city and to measure progress toward this OP target.

6.6.2 TRANSIT RIDERSHIP PER CAPITA

***** *TARGET: 200 rides per capita by the planning horizon*

As demonstrated in the discussion of transit mode split in the previous section of this report, the Ottawa 20/20 OP is in strong support of increased transit use. Annex C of the City's TMP identifies transit ridership per capita as another performance indicator to measure progress on this goal (City of Ottawa, 2003c). The TMP also identifies a target for this indicator at 200 rides per capita by the planning horizon (which was 2021 in the 2003 TMP, and changed to 2031 in the 2008 TMP). Examining whether growth in transit ridership is keeping pace with population growth is a key indication of how well transit service is meeting increased demand, and how the increasing population is taking up transit use.

To carry out this analysis, "Urban Transit Area Population" and "Average Weekday Transit Ridership" data from OC Transpo's annual reported Operating Statistics were used. Following the methodology employed in this City's internal transportation performance monitoring report, the Urban Transit Area population is used rather than the total city population, since rural ridership represents a very small share of all transit trips. The "Average Weekday Transit Ridership" was converted to an estimate of total annual weekday transit ridership by multiplying this figure by five days per week and then by 52 weeks per year. These data were available from 2003 to 2010. Similar data from 1995 to 2002 were obtained from the City's internal monitoring report for transportation indicators, "Transportation Performance Objectives and Indicators Report- Phase I" (City of Ottawa, 2005), Exhibit 4.2.1, since raw data could not be obtained directly.

Progress toward this target is illustrated in Figure 12. Annual transit ridership has increased almost steadily between 1995 and 2010, from a low of just fewer than 65 million in 1996 to a high of just fewer than 102 million in 2010. Transit ridership per capita has also increased during this time, but has experienced greater variations, ranging from a low of 100 rides per capita in 1996 to a high of 127 rides per capita in 2010. Transit strikes in 1996, 2008 and 2009

may have played a role in the dips observed in transit ridership per capita in these years. Transit ridership per capita was rather stable around 120 rides per capita from 2001 to 2006.

Although there is general growth in ridership per capita between 1995 and 2010, with the highest value observed in 2010, the overall change in ridership per capita is relatively slow. At the growth rate illustrated by the trend line in Figure 12, the target of 200 rides per capita will not be met by the end of the planning period (2021 nor 2031). Therefore, greater increases in transit ridership per capita are needed to ensure that progress on this target speeds up so that it can be met by the planning horizon.



FIGURE 12. Annual transit ridership, 1995-2010

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6.6.3 COMPLETION OF THE RAPID TRANSIT NETWORK

***** *TARGET: 100% completion by 2031*

The provision of transit infrastructure is crucial to ensuring that transit service meets travel demand. As the city's population continues to grow, additional transit infrastructure will be required to ensure that transit mode split goals are achieved. Section 2.3.1 of the 2003 OP states that "the rapid-transit system will also be expanded to directly serve much more of the urban area" (City of Ottawa, 2003b, p.23). The 2003 TMP identifies as a target the 100% completion of the planned rapid transit network by 2021 (City of Ottawa, 2003c). Completion was planned to involve a total network length of 188 km; plans included the addition of 100 km of electrified rail service and 42 km of Transitway—the city's bus rapid transit system.

Significant changes to the specific elements of planned rapid transit network and a new target completion timeline were adopted in 2008, during the five-year plan review cycle. The revised planned rapid transit network consists of a total of 138 km being added to the 50 km of the rapid transit system already existing in 2008. Therefore, although the overall length of the planned rapid transit network remains at 188 km, the specific elements of the planned network have changed. The additions to the rapid transit network will be implemented in two phases and comprise a total of 43 km of light rail transit, 63 km of bus rapid transit (Transitway) and 32 km of transit intensive corridors (dedicated bus only lanes during peak hours along strategic roadways). The timeline to meet this revised target is 2031, according to the 2008 TMP. This indicator measures the progress toward implementing the planned 188 km of the rapid transit network. The measure is the percentage of the planned rapid transit network that is completed (the number of km of the rapid transit network in service) as a proportion of the total planned network length. To carry out this analysis, data on the length of the built rapid transit network from the City's annually reported OC Transpo Operating Statistics (obtained through a planner at the City of Ottawa) were used. Data were available from 2003 to 2010.

Figure 13 shows the progress toward the completion of the planned rapid transit network from 2003 to 2010, inclusively. Although there is a slight increase in the built portion of the rapid

transit network from 2003 to 2010, general progress on this target is very slow. As of 2010, only 27% (or 50.6 km) of the rapid transit network has been built, with only 2.3% of the total planned network being added during the observed timeframe.

Given that the planned rapid transit network was just revised in 2008, it is reasonable that there has been little change over the examined time period. In addition, the planned light rail and intensive transit corridor elements of the network have yet to begin implementation. Therefore, although actual implementation of this target has been very slow, there is still great potential for the planned rapid transit network to be completed by the new 2031 target date, as many of the planned projects are expected to be implemented within the next few years. The planned infrastructure projects to achieve the planned rapid transit network are quite costly, however, which could potentially present a challenge in meeting the 2031 target completion.



FIGURE 13. Completion of the Rapid Transit (RT) Network, 2003-2010

6.6.4 CYCLING MODE SHARE

***** *TARGET*:

- *City-wide* = 3% *by the planning horizon*
- Screenlines = TBD according to the TMP

Cycling is increasingly recognized as a sustainable alternative to the automobile for practical trips. In general, the proportion of cycling trips in Ottawa is quite small relative to other modes. Nevertheless, Section 2.3.1 of the 2003 Ottawa 20/20 OP sets a city-wide target for cycling mode share, the amount of cycling trips as a proportion of all trips by all modes, at 3% by 2021 (City of Ottawa, 2003b). In the 2011 consolidation of the plan, the cycling target remains the same, but the planning period has been extended to 2031 (City of Ottawa, 2011b). Given that the results of the 2011 National Capital Region OD Survey were not released in time for this project, progress on the 3% city-wide cycling target could not be evaluated directly in this analysis.

The City's TMP also identifies cycling mode share as a performance indicator in its monitoring framework. Unlike with transit mode split, however, there is no set target for cycling mode share across screenlines as of yet; the plan indicates that a screenline target is still to be determined and remains so even in the 2008 TMP. Despite the lack of a set target for cycling mode share across screenlines, examining the general trend of cycling level across screenlines over time will provide some indication of progress toward the goal of increasing cycling mode share.

To measure progress on this goal, data from the City's Annual Classification and Occupancy Count Program, described in Section 6.6.1, was used. In keeping with the methodology used in the City's internal monitoring report, "Transportation Performance Objectives and Indicators Report- Phase I" (City of Ottawa, 2005), the data required for this analysis include the total number of "Cycling Trips" and number of "All Person Trips", for the afternoon peak period and peak direction (outbound), for the Inner Area Cordon. Data were available from 1995 to 2010.

Figure 14 illustrates the cycling mode share across the Inner Area Cordon for the peak period and peak direction, from 1995 to 2010. This captures the cycling trips out of the city's central

area, and includes a number of pathways used by cyclists. The overall trend from 1995 to 2010 is negative, suggesting that cycling mode share across the Inner Area Cordon is off track with the OP goal of increasing cycling mode share. Between 1995 and 2010, cycling mode share across the Inner Area Cordon ranged from a low of 1.4% in in 2003, to a high of 2.5% in 2010.

It is interesting to note that the cycling mode share was close to 2.5% between 1996 and 1998, but then dropped between 1999 and 2003. However, in looking more closely at trends from 2003 to 2010 (Figure 15), it is apparent that cycling mode share is increasing again. Therefore, general progress on this indicator is moderate, but work is needed to ensure that cycling mode share continues to increase steadily in the future. Progress on the city-wide 3% cycling mode share target should be measured once the 2011 OD data is available; this will give a much better indication of progress toward the city-wide OP goal for cycling mode share.



FIGURE 14. Cycling mode share for the Inner Area Cordon, PM peak period, outbound direction, 1995-2010²³

²³ The last time traffic counts were conducted at the Highway 417 at Parkdale count location was in 2006. There were 11,700 peak period auto person trips counted at this station in 2006. Therefore, all person trips for 2008 and 2010 are adjusted to account for estimated auto person traffic at this count station, assuming a 1% annual growth rate in auto trips at



FIGURE 15. Cycling mode share for the Inner Area Cordon, PM peak period, outbound direction, 2003-2010

6.6.5 CITY-WIDE CYCLING INDEX

***** *TARGET: TBD according to the TMP*

As demonstrated in the discussion of cycling mode share above, the Ottawa 20/20 OP seeks to increase the use of cycling in Ottawa. Annex C of the TMP identifies the City's cycling activity index as another performance indicator to measure progress on this goal (City of Ottawa, 2003c). There is no set target for the cycling activity index in the TMP as of yet; however, the plan indicates that a target for this indicator is still to be determined and remains so even in the 2008 TMP.

this station, as advised by City of Ottawa staff. Cycling trips did not have to be adjusted since this count station was located on a highway where cycling counts did not take place.

The City's cycling activity index measures cycling activity as a function of overall road traffic activity (the number of bicycles observed for every 100 motorized vehicles). The purpose of this index is not to provide an indication of absolute activity levels or cycling modal share, but rather to monitor relative changes in cycling activity over time. The index is calculated using eighthour traffic count data (covers periods from 7:00 am to 10:00 am, 11:30 am to 1:30 pm, and 3:00 pm to 6:00 pm), which takes place on weekdays during spring and summer. As a result, the index primarily captures cycling trips for commuting purposes. The index is reported annually and is presented with the traffic count data grouped into overlapping two-year intervals. Data for this analysis were obtained directly from the "2011 City of Ottawa Cycling Index Report", which provides cycling activity index results from 1995-1996 through to 2010-2011. The composite city-wide cycling index is presented in this analysis, which is derived from traffic count data compiled for all of the geographic areas observed in the index.

Figure 16 shows the composite city-wide cycling index from 1995 to 2011, inclusively. The results reveal an overall decrease in the cycling index over the examined timeframe. The cycling index varies throughout the years from a high of 2.25 in 1995-1996 (i.e., on average about 225 cyclists for every 10,000 vehicles observed) to a low of 1.49 in 2003-2004 (i.e., 149 cyclists for every 10,000 vehicles observed). The most recent cycling activity index, measured in 2010-2011, was 1.63 (i.e., on average about 163 cyclists for every 10,000 vehicles observed). The cycling activity index experienced the steepest decline between 1995-1996 and 2001-2002, after which it has stabilized somewhat between 1.50 and 1.75.

Although no specific target is set for the overall city cycling index, it is clear from this trend that the level of cycling activity as a function of overall road traffic activity has decreased over time, and thus is off track with overall plan goals for cycling. An overall cycling conditions rating is provided with the cycling index each year, to provide an indication of adverse cycling conditions, such as bad weather or construction disruptions. The trend in the conditions rating for the examined time period is increasing; therefore, adverse conditions do not seem to explain the observed decrease in cycling activity. It should be noted, however, that a great deal of cycling activity takes place along off-road pathways, and therefore is not accounted for in this index. Thus, the cycling activity represented in the index is likely an under-representation of the city's overall cycling levels.



FIGURE 16. Composite city-wide cycling activity index, 1995-2011

6.6.6 WALKING MODE SHARE

- ***** *TARGET*:
 - City-wide = 10% by the planning horizon
 - Screenlines= TBD according to the TMP

The City also recognizes the importance of walking trips as an increasingly important alternative to automobile trips. There is a lot of discussion in the Ottawa 20/20 OP about ensuring walkability. Section 2.3.1 of the 2003 Ottawa 20/20 OP sets a city-wide target for walking mode share, the amount of walking trips as a proportion of all trips by all modes, at 10% by 2021 (City of Ottawa, 2003b). The planning horizon for this same target was later extended to 2031 in the 2011 consolidation of the OP (City of Ottawa, 2011b). Again, progress on the city-wide walking

target could not be evaluated directly in this analysis since the results of the 2011 National Capital Region OD Survey would not be released in time for this project.

Although the City's TMP also identifies walking mode share as a performance indicator in its monitoring framework, it does not set a target for walking mode share across screenlines as of yet (City of Ottawa, 2003c). As with cycling mode share, the plan indicates that a screenline target for walking mode share is still to be determined and remains so even in the 2008 TMP. Despite the lack of a set target for walking mode share across screenlines, examining the general trend of walking levels across screenlines over the years will provide some indication of progress toward the goal of increasing walking mode share.

This indicator uses data from the City's Annual Classification and Occupancy Count Program, as described in Section 6.6.1 of this report. In keeping with the methodology employed in the City's internal monitoring report, "Transportation Performance Objectives and Indicators Report- Phase I" (City of Ottawa, 2005), the data required for this analysis include the total number of "Walking Trips" and number of "All Person Trips", for the afternoon peak period and peak direction (outbound), for the Central Business District (CBD) Cordon. Data were available from 1995 to 2010.

Figure 17 presents the results for walking mode share across the CBD Cordon for the afternoon peak period and direction, from 1995 to 2010. Counts across this cordon include various pathways that pedestrians use to reach the City's CBD. The results reveal variations in the walking mode share across the CBD Cordon over time, ranging from a low of 9% in 2000 to a high of 14% in 2002. Overall, there is a positive trend for walking mode share across the CBD Cordon from 1995 to 2010, suggesting that walking levels in this area is on track with the general OP goal of increasing walking mode share. Progress on the city-wide 10% walking mode share target should be measured once the OD data for 2011 is ready; this will give a clearer indication of progress toward this city-wide OP goal.



FIGURE 17. Walking mode share for the CBD Cordon, PM peak period, outbound direction, 1995-2010

6.6.7 SIDEWALK COVERAGE

***** *TARGET: TBD according to the TMP*

The provision of sidewalks along the city's roadways is one of many elements that play an essential role supporting the Ottawa 20/20 OP's goals of ensuring walkability and supporting increased walking mode share. Policy 4.3.9 of the 2003 OP sets sidewalk provision requirements for new and reconstructed roads in the city (City of Ottawa, 2003b). The City's TMP identifies sidewalk coverage as an indicator related to increasing the use of walking as a means of travel (City of Ottawa 2003c). As such, this indicator measures changes in sidewalk coverage, measured as the total length of sidewalks as a percentage of the overall length of roadways in the city. The data used in this analysis include the total length of all sidewalks (lane km) and the total length of all roadways (lane km). Data were obtained from 2003 to 2010 since the City's

internal transportation performance monitoring report did not monitor this target in earlier years due to lack of data.

The results for sidewalk coverage from 2003 to 2010 are illustrated in Figure 18. The general trend over the timeframe examined is a very slow yet steady increase in sidewalk coverage, ranging from a low of 14.5% in 2003 to a high of 16.2% in 2010. Given that no specific target is set for this indicator and the relatively short timeframe for which appropriate sidewalk coverage data has been collected, it is less straight forward to assess progress on this goal. The positive trend during the timeframe examined is encouraging; however, the slow increase and relatively low overall sidewalk coverage (16.2% in 2010) suggests that additional work is needed to ensure the provision of increased sidewalk coverage along city roadways.



FIGURE 18. Sidewalk coverage relative to roadway coverage, 2003-2010

6.6.8 REGISTERED VEHICLES

TARGET: Qualitative goal to reduce automobile dependency before the planning horizon

Policy 2.3.1.2 of the 2003 Ottawa 20/20 OP states that "the City will implement a comprehensive Transportation Demand Management (TDM) program [through a Transportation Master Plan] as part of its long-term efforts to reduce automobile dependency" (City of Ottawa, 2003b, p. 24). Therefore, there is a strong focus in the OP and the TMP to reduce the use of private automobiles. To get a sense of the trend in automobile usage and ownership over time, this target measures the change in the number of registered vehicles per 1000 population. This measure is adjusted for population growth to account for increases in vehicle registrations as a result of increases in the population. Data for this analysis were derived from the City's Annual Collision Statistics Report, and were obtained from 1995 to 2010 to track changes in vehicle registrations before and after plan implementation.

As illustrated in Figure 19, the number of registered vehicles per 1000 population varies throughout the observed time period, from a low of 519 registered vehicles per 1000 population in 1996, to a high of 559 registered vehicles per 1000 population in 2001. As of 2010, the number of registered vehicles per 1000 population was 557, only two below the high of 559 in 2001. The overall trend in registered vehicle per 1000 population is a very slight increase over the examined timeframe. As such, one can determine that progress on this indicator is off track with the general goal of decreasing vehicle dependency. In general, there has been relatively little change in the number of registered vehicles per 1000 population, with periods of both increase and decrease in vehicle registrations. In recent years (from 2004 onward), however, the trend has been a rather consistent increase in vehicle registrations once again. Therefore, more work is needed to ensure that vehicle dependency is further reduced.



FIGURE 19. Vehicle registrations relative to population growth, 1995-2010

6.6.9 VEHICLE COLLISIONS WITH CYCLISTS

***** *TARGET: 30% reduction from 2003 levels by 2010*

Section 1.6 of the Ottawa 20/20 OP states that "safety and security is addressed by policies on ... a safe transportation system" (City of Ottawa, 2003b, p. 7). Increasing the safety of city streets for cyclists is essential to encouraging the increased use of active modes of transportation. The 2003 TMP aims to reduce the number of vehicle collisions with cyclists as an indication of cycling safety in the city (City of Ottawa 2003c). The TMP performance monitoring framework sets a specific target of a 30% reduction in the number of collisions with cyclists from 2003 levels by 2010. The data used to carry out this analysis were obtained from the City's Annual Collision Statistics Report. Although the stated target deals specifically with the timeframe from

2003 to 2010, data were obtained from 1995 to 2010 to examine longer-term changes in collisions with cyclist before and after plan implementation.

Although the target for vehicle collisions with cyclists is for the absolute number of collisions, the results presented in Figure 20 are for both the absolute number of collisions with cyclists, as well as the number of collisions per 1000 population to adjust for population growth. The number of vehicle collisions with cyclists between 1995 and 2010 has fluctuated over time, with a low of 241 collisions in 2001 and a high of 355 collisions in 1995. In looking at the change in the absolute number of vehicle collisions with cyclists from 1995 to 2010 levels (355 collisions and 295 collisions, respectively), the result is a 17% reduction from 1995 levels. In looking at the number of vehicle collisions adjusted for population, the number of collisions per 1000 population in 1995 was 0.510, whereas the number of collisions per 1000 population in 2010 was 0.323, resulting in a nearly 37% decrease in collisions with cyclists from 1995 to 2010, it is evident that there is an overall decrease in vehicle collisions with cyclists over the years.

Looking only at the time period relevant to the stated target (2003-2010), the absolute number of collisions in 2003 was 273, while the number of collisions in 2010 was 295, resulting in an 8% *increase* from 2003 levels, rather than the 30% targeted decrease. In looking at the number of vehicle collisions adjusted for population growth, the number of collisions per 1000 population in 2003 was 0.329, whereas the number of collisions per 1000 population in 2010 was 0.323, resulting in a nearly 2% decrease in collisions with cyclists from 2003 levels. In either case, the set target for the reduction of collisions with cyclists is not close to being met in this shorter timeframe.



FIGURE 20. Vehicle collisions with cyclists per 1000 population, 1995-2010

6.6.10 VEHICLE COLLISIONS WITH PEDESTRIANS

***** *TARGET: 30% reduction from 2003 levels by 2010*

Ensuring the safety of pedestrians is also central to the City's goal of ensuring a safe transportation system (City of Ottawa, 2003b, p.7) and for ensuring that the OP's goals for walkability are met. The 2003 TMP targets a reduction in the number of vehicle collisions with pedestrians as an indication of pedestrian safety in the city. Similar to collision with cyclists discussed above, the TMP performance monitoring framework sets a specific target of a 30% reduction in the number of collisions with pedestrians from 2003 levels by 2010. The data used to carry out this analysis were also obtained from the City's Annual Collision Statistics Report. Although the stated target deals specifically with the timeframe from 2003 to 2010, data were

obtained from 1995 to 2010 to examine longer-term changes in collisions with pedestrian before and after plan implementation.

Although the target for vehicle collisions with pedestrians is for the absolute number of collisions, once again, the results presented in Figure 21 are for both the absolute number of collisions and the number of collisions per 1000 population to adjust for population growth. The number of vehicle collisions with pedestrians from 1995 to 2010 has fluctuated over the years, with a low of 285 collisions in 1999 and a high of 402 collisions in 1995. In looking at the change in the absolute number of vehicle collisions, respectively), the result is a 6.5% reduction from 1995 levels. In looking at the number of vehicle collisions adjusted for population growth, the number of collisions per 1000 population in 1995 was 0.578, whereas the number of collisions per 1000 population in 2010 was 0.412, resulting in a 29% decrease in collisions with pedestrians from 1995 levels. Looking at the trend line for vehicle collisions with pedestrians per 1000 population from 1995 to 2010, it is evident that there is an overall decrease in vehicle collisions with pedestrians over time.

Looking only at the time period relevant to the stated target (2003-2010), the absolute number of collisions in 2003 was 360, while the number of collisions in 2010 was 376, resulting in a 4% *increase* from 2003 levels, rather than the 10% targeted decrease. In looking at the number of vehicle collisions adjusted for population growth, the number of collisions per 1000 population in 2003 was 0.434, whereas the number of collisions per 1000 population in 2010 was 0.412, resulting in a nearly 5% decrease in collisions with pedestrians from 2003 levels. According to the number of collisions adjusted for population, the target is only half met.



FIGURE 21. Vehicle collisions with pedestrians, 1995-2010

6.7 CONSERVE AND ENHANCE GREENSPACE, AGRICULTURAL LAND, AND SENSITIVE NATURAL LANDS

An important aspect of the Smart Growth paradigm is ensuring that development and growth does not undermine the natural assets of a region. The preservation of valuable agricultural lands allows for continued local agricultural production, thus contributing to food security for the region. The conservation of significant natural features, such as forests and wetlands, allows for environmental protection, as well as for maintained ecological functions and local biodiversity. Furthermore, the conservation of naturally significant lands allows citizens to enjoy natural landscapes close to home. The preservation and enhancement of greenspace throughout the urban area is just as important as the preservation of natural and agricultural lands surrounding the city, as these spaces allow for reduced heat islands and provide nearby places for recreational

activity. Progress on this Smart Growth goal is assessed through the examination of three indicators which track the amount of greenspace, agricultural land, and forest and wetland cover in Ottawa over time.

6.7.1 Access to Greenspace

TARGET: Minimum of 4.0 ha of greenspace per 1000 population or approximately 16-20% of gross land area in the Urban Area by the planning horizon

Policy 2.4.5.7 of the 2003 Ottawa $20/20 \text{ OP}^{24}$ sets a target for greenspace for the urban area, to ensure that all urban residents have access to adequate leisure and park space. The specific target has two components: 1) a minimum of 4.0 ha of greenspace per 1000 population, or 2) approximately 16-20% of the gross land area (City of Ottawa, 2003b). This analysis examines the City's progress to date on both parts of the greenspace target.

According to the OP, greenspace for this target comprises parks and leisure lands that are generally accessible to the public, including parks, major recreational pathways, flood plains and other hazard lands, and stormwater management facilities. Areas with restricted access (e.g., school grounds, private golf courses), and land that is temporarily available for open space (e.g., land reserved for transportation corridors and infrastructure) are not included in the target.²⁵ Given this definition and the availability of data, total greenspace in this analysis includes City-owned active parklands and land classified as Passive Recreation²⁶ in the City's Land Use Survey. Lands classified as Active Recreation in the Land Use Survey were excluded from the analysis since it includes both outdoor and indoor facilities, some of which are restricted to the public such as private golf courses or tennis courts. Furthermore, recreation lands on school properties were excluded, as well as parks and passive recreation lands located within the

²⁴ Updated to policy 2.4.5.5 as of the 2007 consolidation of the OP

²⁵ The definition of greenspace for this target provided in the 2007 consolidation of the OP (City of Ottawa, 2007) was used to determine what data to include in the measurement of this indicator, since it was more detailed than the definition provided in the original 2003 OP.

²⁶ Lands designated as Passive Recreation in the Land Use Survey are defined as lands and outdoor parks that are used for informal or unorganized activities. Natural areas and areas of scenic interest such as forests, fields and shorelines (with or without footpaths, cycle paths) are typical examples.

Greenbelt, as per the methodology used in the 2006 Greenspace Master Plan to measure progress on this target in 2006. Therefore, the results presented here may be a conservative estimate of greensapce, but they provide a good indication of access to greenspace within the city's urban subareas.

The data sources used in the estimation of urban greenspace for this analysis are the City's Land Use Survey (the details of which are discussed previously in Section 6.5 of the this report), and the City's inventory of City-owned/leased parkland. The parkland inventory is derived using air photos and landuse, zoning and ownership information, with park boundaries following property parcels 99% of the time. The inventory is updated continuously as new parks are created. It is important to note, however, that the parkland inventory does not contain any federal or provincial parkland, and therefore may underestimate the total amount of greenspace in a given area. In addition, only "active" parklands in this inventory are included in the analysis to ensure consistency in the parkland data used for each year examined.²⁷ Population estimates used in this analysis were derived from the City's Annual Development Report. The results are presented for 2005 and 2010, as these were the only two years for which the City's Land Use Survey could be used.

Figure 22 illustrates the results for the analysis of the amount of greenspace per 1000 population for each of the city's major urban subareas (the total inside the Greenbelt and each suburban area outside the Greenbelt) and for the urban area as a whole, for 2005 and 2010. All seven of the city's urban subareas and the urban area as a whole exceed the greenspace target of 4.0 ha per 1000 population in 2005 and 2010. In general, all areas examined have both active parklands and passive recreational lands, with the exception of Leitrim where greenspace is mostly comprised of parklands.

Overall, the urban area saw very little change in the amount of greenspace per 1000 population between 2005 and 2010 (only a 0.1 ha per 1000 population decrease from 2005 to 2010). Most

²⁷ The 2005 parkland file contains only active parkland, while later years contain active and passive parkland that can be distinguished using the "PARK_TYPE" attribute. As such, only active parklands are considered in the 2010 parkland file, to ensure consistency with the 2005 data.

subareas—including the total area inside the Greenbelt, as well as Kanata, Stittsville, South Nepean and Orleans outside the Greenbelt—saw very little change in total greenspace between 2005 and 2010, although the proportion of active parks to passive recreation lands shifted somewhat during this time period. Leitrim experienced the largest difference in greenspace per 1000 population during the examined timeframe, where the area of active parks decreased from 11.1 ha per 1000 population in 2005 to 4.1 ha per1000 population in 2010. This decrease in greenspace in Leitrim, however, is not due to a great loss of greenspace, but rather is the result of the population in this area nearly trippling between 2005 and 2010. Nevertheless, the total greenspace in Leitrim meets the target as of 2010.

A-GREENSPACE, 2005







Figure 22. Greenspace per 1000 population by urban subarea, 2005 (A) & 2010 (B)

Although the target for greenspace per 1000 population has been met and exceeded in all of the city's urban subareas, it is important to recognize that additional park and passive recreational space will likely have to be provided in each of these areas in the future to ensure that this target remains met as the population continues to grow. As the city's population grows further and these urban subareas become more dense, it may be difficult and perhaps even unrealistic to meet the target of 4.0 ha of greenspace per 1000 population. As described above, most of the decreases in greenspace per 1000 population between 2005 and 2010 in the planning subareas did not have to do with a loss of total greenspace, but rather was the result of an increase in population within the planning subareas during this five-year period. Therefore, it will become very important to consider the target for greenspace in terms of total gross land area, for which the minimum target is set at 16%.

Figure 23 illustrates the results for the area target for both 2005 and 2010 for the total area inside the Greenbelt, each of the suburban areas outsie the Greenbelt, and the total for the urban area as a whole. The results show that none of the urban subareas, nor the urban area as a whole, meet the gross area target for greenspace to date. What is encouraging, however, is that all of the urban subareas and the urban area as a whole experienced overall increases in the percent coverage of greenspace between 2005 and 2010. The one exception is a very slight (0.1%) decrease in the area of greenspace inside the Greenbelt during the five-year period examined. Leitrim is the furthest from reaching the set area target, with greenspace comprising only 3.4% of the gross land area for this subarea in 2010. The area inside the Greenbelt, Orleans and the urban area as a whole are the closest to reaching the set area target for greenspace. Therefore, more work is needed to meet the stated target for the proportion of greenspace relative to the total gross urban land area.



% Gross Land Area, 2010



FIGURE 23. Greenspace as a proportion of total gross land area by urban subarea, 2005 (A) & 2010 (B)

6.7.2 CHANGE IN AREA OF AGRICULTURAL LAND

TARGET: Qualitative goal to preserve agricultural land before the planning horizon

Policy 3.7.3.1 of the 2003 OP expresses a clear goal for "protecting major areas of agricultural and other lands suitable for agriculture from loss to other uses" (City of Ottawa, 2003b, p. 102). To measure progress on this goal, the following indicator examines the change in the total area of agricultural land in the city between 2005 and 2010. The data used in this analysis were derived from the "Agriculture" land use category in the City's Land Use Survey (described previously in Section 6.5 of this report). The change in the area of agricultural land could only be

examined during the five-year period from 2005 to 2010, since the rural area of the city had not been mapped out since 1985 prior to the 2005 Land Use Survey. Nevertheless, this analysis will provide an indication of the change in the area of agricultural land.

The results of the analysis for agricultural land are presented in Table 8. The vast majority of agricultural land in Ottawa (approximately 94%) is located in the city's rural area. The area of agricultural land in the city's rural area declined by almost 1,400 ha between 2005 and 2010, representing a decrease of 1.6%. According to the 2010 Land Use Survey Report, much of this former agricultural land is now classified as idle and shrub land, which comprises non-productive farmlands (i.e., lands that are not in agricultural production nor fallow) that are returning to their natural state.²⁸ In the urban area, the area of agricultural land also decreased by about 2% between 2005 and 2010, whereas the area of agricultural land within the Greenbelt increased slightly (approximately 1%) between 2005 and 2010.

Overall, there was a 1.4% (approximately 1,350 ha) decrease in the total area of agricultural land between 2005 and 2010 across the city. Although this is not a very large decrease over a five-year timeframe relative to the total amount of agricultural land in the city, the results suggest a divergent trend from the City's goal to maintain and protect agricultural lands. The majority of the lost agricultural land during the five-year timeframe examined is the result of farmlands returning to their natural state as either idle and shrub land or forest (perhaps because they were sold or abandoned), although some loss is also attributable to residential development.

²⁸ Idle and shrub lands have increased by 1,650 ha between 2005 and 2010.

Vead	AREA (HA)				
I EAR	URBAN	GREENBELT	RURAL	TOTAL	
2005*	317.7	5,069.5	89,899.7	95,286.9	
2010	311.4	5,125.5	88,501.4	93,938.3	
Change 2005-2010	-6.3	56.0	-1,398.3	-1,348.6	
% Change 2005-2010	-2.0%	1.1%	-1.6%	-1.4%	

TABLE 8. Area of agricultural land, 2005 & 2010

*Revised numbers for 2005 as presented here, as presented in Appendix 2 of the 2010 Land Use Survey Report

6.7.3 CHANGE IN AREA OF FORESTS & WETLANDS

***** *TARGET*:

- 30% forest cover for the entire City by the planning horizon, pending completion of a forest strategy
- Qualitative goal to protect wetlands before the planning horizon

Abundant natural features, such as forests and wetlands, are a distinctive characteristic of the City of Ottawa. These features are recognized for their environmental significance and are highly valued by local residents. Policy 2.4.2.1 of the OP states that "the City will protect natural features and functions in the urban and rural area by designating in this [Official] Plan forests, wetlands and other natural features which perform significant natural functions" (City of Ottawa, 2003b, p. 35). In addition, policy 2.4.5.1b of the 2003 OP²⁹ sets a target for forest cover of 30% of the entire city (City of Ottawa, 2003b). Therefore, this indicator tracks changes in the total area of forests and wetlands in the city.

²⁹ Updated to policy 2.4.5.7 in the 2011 consolidation of the OP

The data used to carry out this analysis were derived from the City's 2005 and 2010 Land Use Survey (described in Section 6.5 of this report). Changes in the classification of some natural features between the 2005 and the 2010 Land Use Survey, particularly the addition of a new "forested-wetland" category, has made the direct comparison of natural features between the two surveys rather difficult. Therefore, a more accurate and detailed comparison of natural features, including forest, wetlands and forested wetlands, will only be possible in the next comprehensive Land Use Survey planned for 2015. Nevertheless, an attempt was made to present some indication of progress toward this goal using the results of the 2005 and the 2010 Land Use Survey.

Table 9 shows the area of forest and wetlands in 2005 and the area of forests, wetlands and forested-wetlands in 2010. Although the differences in the area of forest and wetlands cannot be compared directly between 2005 and 2010, looking at the area of all three natural features combined gives some indication of the change during this five-year time period. When all three natural features are combined the total area of natural features in 2010 is approximately 1,800 ha less than in 2005, resulting in an overall decrease in the area of natural features of approximately 2.1%. According to the 2010 Land Use Survey report, part of this loss is due to the conversion of 430 ha of natural lands to new residential uses during this timeframe.

The percent coverage of the city's total area for all natural features for both 2005 and 2010 is also provided in Table 9. There was a slight decrease in the percent coverage of the city's total area with natural features from 2005 to 2010, thus diverging somewhat from the goal to preserve natural features. Although the change in percent forest cover between 2005 and 2010 cannot be directly measure due to changes in the land use categorization, the percent forest cover in 2010 was 22% of the city's total land area, eight percentage points below the 30% target. Even, even if forested-wetland is added to the total value for forest for 2010, only 25.9% of the city's total area is forested, still 4.1% below target. Given this new classification of natural land uses, the target for forest has to be clarified to identify whether forested wetlands are included in the target. The next results of the next detailed Land Use Survey in 2015 will give a much better indication of change with respect to this OP target. For now, it can be concluded that the target is not met to

date, and that there is likely some loss of forest over time. Therefore, more work is needed to ensure that this target is met in the future as the Ottawa 20/20 OP continues to be implemented.

YEAR	Forest	WETLAND	Forested Wetland	TOTAL NATURAL FEATURES	% CITY Area***	
2005*	67,880.4	17,017.5	-	84,897.9	30.4%	
2010	61,531.4	10,828.5	10,730.6	83,090.5	29.8%	
Change 2005-2010 **	-	-	-	-1,807.4	0.6%	
% Change 2005-2010 **	_	-	-	-2.1%	_	

TABLE 9. Reported area of forest and wetland, 2005 & 2010

*Uses revised numbers for 2005, as presented in Appendix 2 of the 2010 Land Use Survey Report

** Difference for individual natural features are not reported since the results of the 2005 and 2010 surveys cannot be directly compared due to changes in land use categorization

*** Total City area report in the 2010 land use survey was used; 279,137.8 ha

6.8 SUMMARY OF PLAN OUTCOMES

Table 10 summarizes the results of the City's progress on each of the Smart Growth indicators to date. Of the 21 indicators examined in this analysis, nine are on track with meeting the Ottawa 20/20 goals and targets, four are off track with the Ottawa 20/20 goals, and the remaining eight have experienced little changes or have mixed outcomes to date. The next chapter of this report provides a more detailed discussion of the results of this analysis.

TABLE 10. Summary of progress on all 21 indicators to date

	GOAL / INDICATOR	Performance To Date
Goa	I 1: Create a range of housing options	
1.1	Housing mix index over time	\checkmark
Goa	1 2: Create compact neighbourhoods	
2.1	Net development density (du/net ha) in suburban areas	\checkmark
Goa	1 3: Strengthen and encourage growth in existing communities	
3.1	Intensification share of new urban residential units	\checkmark
3.2	Proportion of new residential units built inside the Greenbelt	\checkmark
Goa	I 4: Strengthen the urban structure (activity centres connected by transit)	
4.1	Share of new residential units in target areas	\checkmark
4.2	Employment levels in nodal centres	~
Goa	1 5: Promote a mix of land uses	
5.1	Land use mix index by Mixed Use Centre	\checkmark
5.2	Land use mix index by planning subarea	\checkmark
Goa	I 6: Promote a variety of transportation options	
6.1	Transit mode split	\sim
6.2	Transit ridership per capita	\sim
6.3	% Completion of rapid transit network	\sim
6.4	Cycling mode share	~
6.5	City-wide cycling index	\mathbf{x}
6.6	Walking mode share	\checkmark
6.7	Sidewalk coverage	\sim
6.8	Vehicle registrations	×
6.9	Collisions with cyclists	\sim
6.10	Collisions with pedestrians	\sim
Goa	17: Conserve and enhance open space, agricultural land, and sensitive national	ural lands
7.1	Access to greenspace	\checkmark
7.2	Change in area of agricultural land	×
7.3	Change in area of forests and wetlands	×
Ι	LEGEND: 🗸 On Track 🔷 Little Change or Mixed Outcomes	×Off Track
Chapter 7:

Discussion

This chapter provides a discussion of the results of the evaluation analysis presented in Chapter 6, as well as a summary of the various lessons that can be derived from Ottawa's experience with regard to Smart Growth implementation and evaluation. This discussion is based partially on the professional interviews that were conducted with three planners at the City of Ottawa in Phase 4 of this research project, to gain insight on the implementation successes, challenges and barriers of the Ottawa 20/20 plan.

7.1 UNDERSTANDING PLAN OUTCOMES

Similar to the results found in the evaluation studies reviewed in Section 3.2.2 of this report, the results of the evaluation of the Ottawa 20/20 plan implementation revealed mixed outcomes. Some of the Smart Growth goals that were found to have outcomes that are the most consistent with Smart Growth goals, include: providing a range of housing options, achieving more compact suburban densities, intensifying existing residential areas, and promoting a mix of land uses (goals 1, 2, 3, and 5 respectively). The remaining Smart Growth goals were found to have mixed outcomes, including: strengthening the urban structure, promoting a variety of transportation options, and conserving open space, and agricultural and natural lands (goals 4, 6, and 8 respectively). While none of the Smart Growth goals themselves were found to be entirely off track with Smart growth goals, a few specific indicators were, including: the city-wide cycling index and vehicle registrations per 1000 population under the goal to provide a variety of transportation options, and the change in the area of agricultural land and natural features under

the goal to preserve open space, agriculture and natural lands. This section explores some of the reasons behind the observed outcomes, highlighting some of the key insights obtained through interviews with City planners.

For some of the indicators that had positive outcomes in this analysis, there is an interesting pattern that emerged among the outcomes for the different suburban areas located outside the Greenbelt. Stittsville was found to have one of the lowest rankings of all of the suburban areas for housing mix, suburban residential densities, and land use mix (although still performing rather well), while Leitrim was among the highest ranking suburban areas for these same indicators. One of the interviewees indicated that this difference might arise from the fact that Leitrim has the advantage of having started out as a field; it was a "blank slate." Stittsville, on the other hand, has a long history of being a remote village, but with growth over time "the city caught up to it." Therefore, the shift from being a distinct village to becoming a suburb of the city may have prompted the residents of Stittsville to "take the stance that to maintain the character of the community it means big lots, it means large homes, it means wide frontages..." Understanding the potential reasons behind the outcomes in different areas might be helpful for ensuring further implementation success in the future.

Specific indicators that were found to be changing in a way that is inconsistent with the City's Smart Growth goals include the change in the area of agricultural land, and the change in the area of forest and wetlands. When asked about the loss of natural lands (forests and wetlands) between 2005 and 2010, one interviewee indicated that most of this loss likely occurred in areas inside the designated urban area that had been slated for urban growth for some time. However, the interviewee also noted that "in the most recent exercise to add additional urban land [to the designated urban area,] steps have been taken to ensure that natural features in candidate areas for development are identified and are to be transferred to the City." In addition, it was noted that the City has adopted a tree cutting by-law to prevent tree removal on lands in areas slated for development. Although these new measures may not completely prevent further loss of natural features, it is likely to help reduce the amount of loss over time.

With regard to the small loss of agricultural land between 2005 and 2010, an interviewee pointed out that much of the urban area boundary is adjacent to agricultural land, making it very difficult to avoid the conversion of these lands as the urban area expands. It was also noted that "intensification may slow the erosion of these lands but it is unlikely to prevent additional loss of agricultural land in the future." New provincial legislation in the *Planning Act*, which requires that all future expansions of the urban area be part of the municipality's comprehensive plan review cycling (i.e., private amendments to the OP to expand the urban area are no longer permitted), was cited by the interviewee as the most significant measure that has been taken to prevent or at least slow the loss of agricultural land.

The results for the transportation-related indicators showed mixed outcomes, echoing the overall results of the City's two transportation performance evaluation reports (see City of Ottawa, 2005 and 2008b). Although the analysis for transit mode split revealed general increasing trends, the rate of increase in transit mode split across the Greenbelt is well below target. Some of the interviewees suggested that this outcome may be an indication that the level of transit service across the Greenbelt is still not convenient or simple enough to justify the use of transit over the private vehicle, noting that as long as the private vehicle is still more efficient than transit, people will continue to use it. One interviewee described the area outside the Greenbelt as having "an automobile logic." That most of the new growth in the city is occurring in suburban areas outside the Greenbelt where the car still seems to dominate might explain why the number of registered vehicles per 1000 population has a slight increasing trend during the timeframe examined. An interviewee suggested that the continuing increase in vehicle registrations is likely also attributable to the expectation in North-American culture that at a certain age many individuals start to drive and get their own vehicle.

With regard to cycling, in addition to the negative overall trend for the cycling index, there is an overall long-term negative trend for cycling mode share from 1995 to 2010 (refer to Sections 6.6.4 and 6.6.5 of this report). Potential reasons cited by an interviewee for this overall decline in cycling mode share and the cycling activity index include the increase in the volume of vehicular traffic that occurred as the city grew, as well as the overall lack of practical, commuting-based cycling facilities (cycling facilities in Ottawa have traditionally been

recreational in nature). However, from 2003 onward, the trend for cycling mode share began to increase again, although cycling levels have not yet recovered to mid-1990s levels. Reasons for this increase in recent years is potentially the result of an increasing cycling culture in many large cities, as well as the construction of several new, more practical cycling facilities in recent years (such as the bicycle path along Laurier Avenue in the downtown core). The same interviewee noted that cycling in Ottawa is likely to "comeback with the urban commuter who is within an acceptable biking-time commute of the job, if [the City is] able to provide more road safety for that bike commuter." However, the evaluation results indicate that the reduction in the number of vehicle collisions with pedestrians and cyclists over time is well below the target reduction rate (refer to Sections 6.6.9 and 6.6.10 of this report). One interviewee noted that "the more the city grows, the more there are impediments to you getting to your point in time, so the more you get road rage, and the more you get these erratic behaviours in drivers…and that's very, very difficult to fight."

Although the majority of the City's designated Mixed Use and Town Centres achieved a high land use mix, several of these centres did not achieve the employment targets. The three Town Centres in particular, all of which are located outside the Greenbelt, are furthest from reaching the targeted number of jobs (which is 10,000 jobs for Town Centres). One interviewee explained that these Town Centres have taken on more of a retail role, since most of the significant employment that moves out to the suburbs establishes outside of the Town Centres, particularly federal operations that have the opportunity to create many new jobs. An example that was given is the uptake of the old Nortel campus in the far west-end of Ottawa by the Department of National Defence. The interviewee noted that it is a difficult situation since the City cannot prevent an organization from buying an empty building or campus, even though it is detrimental to the achievement of OP policies and has significant consequences on transportation patterns. Thus the availability of such campuses or buildings outside of the Town Centres makes it difficult to attract jobs and development to the centres themselves. The interviewee indicated that "the employment future of the Town Centres is on hold for the foreseeable future, because right now there is nothing really happening to do something about it... [The City is] doing this at the peril of maintaining these Town Centres in their infancy for a very long time." The interviewee suggested that a way to try to overcome this barrier is to negotiate with potential employers

(including the federal government) to ensure that employment is focused in the Town Centres. Perhaps the City could also provide some sort of incentive to attract development and jobs to suburban Town Centres.

It is interesting to compare the outcomes of the analysis carried out in this research project to the responses that the three interviewees gave when asked which Smart Growth goals (or specific indicators) they thought generally receive the most and the least attention and resources in terms of implementation. The main responses for the most attention and resources were intensification (especially downtown), transportation options (particularly with light rail), and land use mix, while the responses for the least attention were the provision of greenspace to support intensification in older areas, and directly addressing housing mix. The results of the analysis indicate positive outcomes for intensification and land use mix, and mixed outcomes for transportation goals. Housing mix also had positive results despite being noted here are not being directly addressed or required. The results for the provision of greenspace, however, may reflect the comment above since the observed decrease in greenspace per 1000 population in some areas is not due to the loss of greenspace itself, but rather is due to an increase in the population within the area (although the change observed for the area inside the Greenbelt where most of the intensification takes place is rather minimal).

One interviewee pointed out that there are some Smart Growth elements that received a great deal of attention, but still do not produce the desired outcomes. An example that was given is the goal of creating compact neighbourhoods, particularly increasing residential densities in suburban areas. The interviewee explained that "we are getting density, but we are getting streetscapes that are really underwhelming," further stating that "density done wrong is not the answer; it has to be pedestrian-supportive." Thus it is important to recognize that even though an indicator shows progress toward a goal, it does not necessarily mean that there is real improvement on the ground. This demonstrates the importance of supplementing the assessment of quantitative indicators with qualitative methods (such as these interviews) in order to get a more complete picture of what is actually occurring on the ground. Implementation outcomes of this type are where the evaluation process presents an opportunity to rethink the way that goals

are being implemented, allowing a municipality to make changes to policies, regulation or guidelines to ensure that future implementation efforts achieve more positive outcomes.

Discussions with City planners also revealed several similarities between the implementation challenges in Ottawa, and those cited in previous studies examined in the literature review (refer to Chapter 3 of this report). For instance, the issue of existing local regulations and development standards that contradict sustainable land use goals was cited by one interviewee as being an issue in Ottawa, noting that the City still has "a lot of legacy policy stuff kicking around that contradicts what [they] are trying to do." The interviewee suggested that the best way to overcome the challenge of outdated, contradictory policies is "to not be scared to put a finger on it and change it." The challenge of persistent consumer preference for single-family, low density homes (particularly because most new residential development in Ottawa is suburban) was also noted as an implementation challenge in Ottawa, as well as the continued opposition of some residents to intensification in their neighbourhoods. In addition, while transit use is increasing in Ottawa, progress on the implementation of transit infrastructure projects has generally been quite slow to date (refer to Section 6.6.3 of this report). While the implementation of the light rail project in the coming years will significantly boost progress toward completing the planned rapid transit network, the slow progress on providing increased rapid transit infrastructure to date may be contributing somewhat to the continued increase in vehicle registration levels and the slow increase in transit mode split across the Greenbelt.

7.2 INSIGHTS ON PLAN EVALUATION IN OTTAWA

As mentioned in Section 4.3.3 of this report, the plan to implement a monitoring program for the Ottawa 20/20 Growth Management Strategy was never fully realized. When asked what ever became of the plan for this evaluation framework, one interviewee said that at the time of the development of the Ottawa 20/20 Growth Management Strategy, City staff "put a lot of effort into developing an indicator reporting program because [they] hoped that it would be done, but it wasn't." The interviewee noted that in the end the implementation of the planned evaluation framework for the Ottawa 20/20 Growth Management Strategy "was consciously not done,"

stating that "it was not a priority" and that "there was no commitment to actual reporting." Although not suggested by any of the interviewees, it is possible that the newly elected City Council in 2006—a short time after the adoption of the Ottawa 20/20 Growth Management Strategy—may not have felt bound by the reporting plans made by the previous Council.

It was very encouraging to find that, despite not having fully implemented the evaluation program planned for the Ottawa 20/20 Growth management Strategy, the City of Ottawa collects a great amount of data that is used or can be used to track progress on the Smart Growth goals of the OP. The majority of the data used in this project was obtained through the City's Planning and Growth Management Department; however, some elements that had to be tracked down from various other departments at the City (including the Information Technology Services Department or the Public Works Department). It was not always clear where to find the data required for this analysis; the process proved to be rather time consuming.

In addition, while several of the indicators examined herein are currently being tracked by City staff on a regular basis (or at least appropriate data is being collected), reporting of the progress on these indicators is presented in various specialized reports (such as the Annual Development Report, the Vacant Urban Residential Land Survey report, the Employment Survey report, and the Land Use Survey report). In addition, reports evaluating progress on the transportation indicators listed in Annex C of the TMP (see City of Ottawa 2005 and 2008b) do not consider all of the indicators at once because there are too many (approximately 45 indicators for transportation outcomes alone). While these specialized reports are useful and necessary for the City to effectively manage operations and growth within the city, and while the large number of transportation indicators provides very detailed insight into transportation outcomes, this all makes for a somewhat fragmented reporting system. As mentioned previously in Section 4.3.3 of this report, although the City's Annual Report brings together a consolidated reporting of the City's progress on an annual basis, this report is highly outputs-based and does not give details about many plan outcomes like the detailed reports listed above.

Another interesting finding is that some of the targets that are set out in the OP are difficult to measure with data that is currently being collected (or at least with the data available for this

project). For example, the target for 30% forest cover was difficult to measure using the results of the City's detailed Land Use Survey since the specific land use categories changed between 2005 and 2010 (particularly the introduction of the "forested-wetland" category). Nevertheless, this change in the Land Use Survey will allow for more detailed data on natural features in future surveys, although the City will have to ensure that they specify which categories are included in the forest cover target (i.e., does the target include forested-wetland as well as regular forest cover?). One interviewee pointed out that some of the goals of the OP do not lend themselves to objective, quantitative analysis. An example of this is the goal to create a sense of place within a community, which was excluded from this analysis partly because it is not easily quantifiable and is very subjective. Moreover, some of the targets set out in the OP generally lack clarity or meaning. For instance, an interviewee noted that the target of 4.0 hectares of greenspace per population in the urban area is a rather meaningless measure, stating:

In terms of greenspace—urban greenspace and urban parkland for citizens—I say quality over quantity. Who cares how many hectares you have per 1000 population, but what do they look like, where are they? Are they a carpet of grass with nothing on it? Are they at the edge of the community or at the middle of it? That number means nothing... So what's wrong with intensifying the number of people using a park? Nothing, really.

One interviewee suggested that there is not so much an issue of a lack of monitoring and evaluation at the City of Ottawa; rather it is more an issue of coordination and communication of the monitoring and evaluation that is being carried out. This is evident in the City's current fragmented approach to monitoring and evaluation, as well as in the lengthy process of gathering data for this research project. It took a great amount of time and a lot of communication with City staff to find much of the data that is currently being gathered and the reports that are currently being produced by the City to monitor and track progress on various goals, especially for data covering a long timeframe. The analysis carried out in this study would certainly not have been possible without the assistance of individuals at the City.

Given the amount of time and resources required to carry out a detailed evaluation of plan outcomes, an interviewee also suggested that reporting should be consolidated at the corporate level, and that the City should choose "just a few key indicators and keep reporting on them systematically." This opinion echoes the recommendations in the plan evaluation literature to streamline the number of indicators that are examined to ensure that the indicators that are assessed are done so thoroughly and continuously as part of the routine planning process. Further, reporting at the corporate level could simplify the evaluation process by allowing the same indicator to be used for measuring the outcomes of different policy areas.

Similar to the findings of the literature review, a main challenge to effective and consistent plan evaluation in Ottawa as cited by interviewees is the subjectivity of what defines "progress" or "success." One interviewee indicated that there is an overall lack of clearly articulated goals and targets in the Ottawa 20/20 plans. This was evident during the review of the Ottawa 20/20 OP and supporting plans conducted in Phase 2 of this research project. The seven guiding principles of the Ottawa 20/20 initiative incorporate all of the key Smart Growth goals, but they are not clearly presented as such. Moreover, identifying specific targets set out in the OP requires one to search through the various sections of the plan, unlike the TMP in which the key goals and targets of the plan are clearly lists in the appendix. The interviewee noted that there is a need to more clearly and directly highlight specific goals within the OP.

7.3 LESSONS FROM OTTAWA'S EXPERIENCE

Conducting this plan evaluation study for the Ottawa 20/20 OP and supporting plans proved to be rather challenging and time consuming. Nevertheless, the experience provided valuable insight into the implementation of Smart Growth on the ground, as well as a greater understanding of the plan evaluation process and challenges. Through the evaluation exercise carried out in this research project and the insightful interviews with three City employees, several lessons can be derived.

The key lessons from Ottawa's experience with Smart Growth implementation and evaluation are the following:

• There is a need to "prepare the ground" for implementation. The City must prepare for the implementation of Smart Growth goals to facilitate the uptake of Smart Growth

practices and to ensure greater success on the ground. This includes: increased coordination between relevant City departments, as well as service providers and other relevant groups; ensuring that regulatory tools are updated to reflect and support plan goals; and ensuring that the priority of infrastructure projects (particularly transportation projects) reflects plan goals.

- Clear direction for achieving success is essential. The successful implementation of Smart Growth on the ground must begin with a clear definition of what success means in relation to each Smart Growth goal and how this success can be achieve. Therefore, plans must provide clear, measurable targets wherever possible. It is also important to set specific timelines by which targets should be met in order to effectively track progress toward the stated goal.
- Plan evaluation should be an integral part of the routine planning process. The amount of time and resources that is put into the development of plans warrants a greater amount of effort to ensure that plans are being implemented effectively. For example, the Ottawa 20/20 OP is the result of a nearly two-year, extensive planning process (and some of the supporting plans took even longer to develop). If an evaluation of the plan outcomes is not carried out as part of the standard planning process, then it is not possible to know whether the plan is achieving the desired outcomes or not, which may challenge the legitimacy of the planning practice.
- Less is sometimes more in plan evaluation. It does not make much sense for a municipality to identify many different indicators and targets that do not have any real meaning or that will not be tracked continuously over time. Instead, it is much more beneficial for a municipality to identify a few key indicators and targets that are meaningful and that will realistically be measured consistently. Therefore, it may not be realistic or desirable to expect that a municipality will carry out an evaluation study on the scale presented herein on a regular basis. It is important to ensure that monitoring and evaluation is manageable for the municipality to continue on a regular basis. The consolidation of reporting at the corporate level may help to facilitate plan evaluation, as it can allow for the use of a single indicator to measure progress in various policy areas.

- Evaluations should focus on outcomes, not just outputs. While there is a general tendency for municipalities to regularly report on plan outputs (i.e., *what* has been implemented), it is equally important to assess the outcomes of plan implementation (i.e., the *results* of implementation). Evaluation of the plan outcomes demonstrates whether or not the plan is achieving the intended goals. Although the evaluation of plan outcomes is more difficult than the reporting of plan outputs, it can be much more meaningful and informative. Reporting of outcomes and outputs together would be most valuable.
- Evaluations present an opportunity to improve plan implementation and to celebrate implementation achievements. The plan evaluation process should consider both the positive and the negative outcomes of plan implementation. The former gives the municipality the opportunity to acknowledge their successes, while the latter could provide the municipality with valuable insight to make improvements to policies, programs and guidelines to help increase the level of implementation success in the future.
- Effective communication of evaluation results is important. The development of a plan involves some level of community consultation; the Ottawa 20/20 initiative had an unprecedented community consultation component. Informing citizens of the progress that is being made with regard to plan implementation, and showing the impact that the plan is having in shaping the city's growth and development can garner increased citizen support for the plan, and may help to reduce the amount of resistance to plan implementation.
- It is important to supplement quantitative assessments with qualitative methods. The interviews with planners at the City of Ottawa provided invaluable insight into the outcomes of the evaluative assessment carried out in this research project. While conducting a quantitative assessment tells part of the story, the interviews brought further depth to the analysis by identifying potential barriers to the achievement of certain goals, and shedding light on areas where the outcome on the ground was not being fully accomplished in ways that are not captured by the quantitative methods.

Chapter 8:

Conclusion

Many cities in North-America have adopted Smart Growth plans in recent years in the hopes of curbing sprawl and ensuring more efficient infrastructure provision. However, the lack of studies evaluating the implementation success of Smart Growth principles on the ground has prompted questions about whether these principles are actually being implemented and whether they are achieving their intended outcomes. This study offers a case-study example of Smart Growth plan evaluation in Ottawa, to address the gap in plan evaluation literature and to gain a better understanding of whether plan goals are really being achieved. The study explores the changes that have occurred since the adoption of the Ottawa 20/20 OP (and supporting plans) to assess whether the changes are consistent with the Smart Growth goals of the OP. This research also explores some of the reasons that might explain the observed implementation successes and failures, and derives lessons that can be learned from Ottawa's experience that could help cities in future long-term planning initiatives and evaluation efforts.

The evaluation framework developed to carry out the assessment of the Ottawa 20/20 OP outcomes consisted of a total of 21 indicators, representing seven quantifiable Smart Growth goals. As noted in the Methodology, this project focuses only on outcomes (the changes in the indicators through time), rather than specific outputs or actions that the City has taken to affect these outcomes and to implement the Ottawa 20/20 OP, since this is an area that is less explored. Nevertheless, it is important to acknowledge that it is difficult to be certain whether the changes observed for the indicators chosen for evaluation (the dependent variables) are actually related to the plan (the independent variable). Some of the changes observed for these indicators may, in part, be due to changing household demographics, trends toward increased development of

condominiums and multi-unit housing, among other trends that are not necessarily related to the Ottawa 20/20 Plan itself.

The results of this evaluation revealed mixed outcomes with regard to Smart Growth implementation in Ottawa, since the plan adoption in 2003. Nine of the 21 indicators were found to be changing in a way that is consistent with the Ottawa 20/20 Smart Growth goals and targets, four are changing in a way that is inconsistent with the Ottawa 20/20 goals, and the remaining eight have changed very little or have had mixed outcomes to date. The Smart Growth goals that were found to be changing in a way that is most consistent with Smart Growth goals in Ottawa to date include: providing a range of housing options, achieving more compact suburban densities, intensifying existing residential areas, and promoting a mix of land uses. Progress on the Smart Growth goals related to strengthening the urban structure, promoting a variety of transportation options, and conserving open space, and agricultural and natural lands were found to have mixed outcomes, with some specific indicators showing trends that are inconsistent with the Smart Growth goals of the Ottawa 20/20 Plan (such as the city-wide cycling index, vehicle registrations per 1000 population, and the change in the area of agricultural and natural lands). Interviews with three key planners at the City of Ottawa added depth to the evaluation analysis, by shedding light on the potential reasons behind various observed plan outcomes, and identifying some key challenges to plan implementation and evaluation in Ottawa.

As with most studies, this research project faced a few limitations. The restricted timeline for the completion of this project limited the number of Smart Growth goals and indicators that could be assessed in the evaluation framework. In addition, the timeline for the release of certain data was not compatible with the timeframe for completing this project, including the 2011 Census data and the National Capital Region's 2011 OD Survey. As such, alternative data sources had to be identified for certain indicators (e.g., target employment levels), and some of the targets set out in the Ottawa 20/20 OP and supporting plans could not be measured directly (e.g., the city-wide mode share/split targets). Communication with employees at the City of Ottawa was crucial for identifying data sources. Finally, the number of planners at the City that could be interviewed as part of this research was also limited due to the time constraints of the project.

Further research in this area should focus on assessing all 10 of the key Smart Growth goals, including those that were not examined in this current study (such as creating a sense of place, ensuring broad-scale, integrative planning, and encouraging community and stakeholder engagement). In addition, the analysis of progress on indicators and targets that could not be fully assessed in this study should be conducted as data becomes available, such as the 2011 OD Survey data to measure progress toward the city-wide mode share/split targets for walking, cycling and transit. Future studies similar to this research would benefit from additional qualitative research, including additional interviews with City planners who are familiar with the city and its development. Some level of ground-truthing could also help to confirm the results of the quantitative analysis, and to get a better sense of the quality of the build environment (i.e., whether a community is truly pedestrian-friendly or whether it has a sense of place). Finally, future plan evaluation research would benefit from considering both plan outputs and plan outcomes simultaneously, to more fully understand how the specific policies in the plan are affecting the observed outcomes.

The recent Choosing our Future project—a joint planning initiative of the City of Ottawa, the City of Gatineau and the National Capital Commission— sought to integrate sustainability, resiliency and liveability into the planning process for Canada's capital region. This initiative was just completed in 2012, and has led to the development of three strategic plans that put all three parties on the same page in terms of guiding principles and a framework for managing growth in a way that ensures a sustainable future for the region. The City of Ottawa is currently planning a review of the OP in 2013 to integrate some of the key aspects and principles of the Choosing our Future initiative into the City's OP. One interviewee noted that prior to this review process, the City plans to conduct a review the Ottawa 20/20 OP to evaluate what is missing, what are its strengths, and what can be done to further strengthen the plan for the long term. The lessons derived from this research project with regard to Smart Growth implementation and evaluation may prove to be useful in this plan review process in Ottawa, as well as for other cities that have adopted or are planning to adopt Smart Growth plans.

Bibliography

- Bae, C. (2002). "Orenco Station, Portland, Oregon: A Successful Transit-Oriented Development Experiment?" *Transportation Quarterly*, 56 (3): 9-18.
- Baer, W.C. (1997). "General Plan Evaluation Criteria: An Approach to Making Better Plans". *Journal of the American Planning Association*, 63 (3): 329-344.
- Berke, P., M. Backhurst, M. day, N. Ericksen, L. Laurian, J. Crawford & J. Dixon (2006). "What makes plan implementation successful? An evaluation of local plans and implementation practices in New Zealand". Environment and Planning B: Planning and Design, 33: 581-600.
- Blais, P. (2010). *Perverse Cities: Hidden subsidies, wonky policy, and urban sprawl*. Vancouver, BC: UBC Press.
- Bowman, S. (2007). "Sustainability Assessment and the Ottawa 20/20 Growth Management Strategy". Department of Environment and Resource Studies, University of Waterloo. Online:
 <u>http://www.environment.uwaterloo.ca/ers/research/490s/documents/SBowman490s.pdf</u> (Accessed June 2, 2012).
- Brinklow, A. (2010). "Transit Oriented Development: A Policy Implementation Strategy". Master's Supervised Research Project, McGill University.
- Burchell, R.W., D. Listokin & C.C. Galley (2000). "Smart Growth: More Than a Ghost of Urban Policy Past, Less Than a Bold New Horizon". Housing Policy Debate, 11 (4): 821-879.
- Cambridge Systematics Inc. (2004). "Transportation Impacts of Smart Growth and Comprehensive Planning Initiatives". Online: <u>http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/25-25%282%29_FR.pdf</u> (Accessed January 19, 2012).
- Chen, X. (2008). "The Evaluation of the Implementation of Smart Growth in Chinese Official Plans: a case study of Xuzhou City, China". Graduate Research Thesis, University of Waterloo.
- City of Ottawa (2001-2012). "City of Ottawa Annual Reports". Online: <u>http://ottawa.ca/e/WD024374</u> (Accessed July 12, 2012).

City of Ottawa (2001). "Ottawa 20/20 Backgrounders"

City of Ottawa (2002). "Charting a Course: The Next Step." City of Ottawa.

City of Ottawa (2003a). "A Window on Ottawa 20/20".

City of Ottawa (2003b). "Ottawa 20/20 Official Plan".

City of Ottawa (2003c). "Transportation Master Plan".

City of Ottawa (2005). "Transportation Performance Objectives and Indicators Report – Phase I". Prepared by McCormick Rankin Corporation.

City of Ottawa (2007). "City of Ottawa Official Plan Consolidation - January 2007".

City of Ottawa (2008a). "Transportation Master Plan".

- City of Ottawa (2008b). "Transportation Performance Objectives and Indicators Report Phase II". Prepared by McCormick Rankin Corporation.
- City of Ottawa (2011a). "Annual Development Report, 2010". Online: (Accessed January 20, 2012).
- City of Ottawa (2011b). "City of Ottawa Official Plan Consolidation".
- City of Ottawa (2012). "Quick Facts". Online: <u>http://ottawa.ca/visitors/about/quick_facts_en.html</u> (Accessed May 27, 2012).
- CMHC (2010). Research Highlight: Comparing Canadian New Urbanist and Conventional Suburban Neighbourhoods". Canadian Housing and Mortgage Corporation. Online: <u>http://www.cmhc-schl.gc.ca/odpub/pdf/66954.pdf?fr=1300728026920</u> (Accessed January 19, 2012).
- Downs, A. (2005). "Smart Growth: Why we Discuss it More than we Do It?" *Journal of the American Planning Association*, 71 (4): 367-378.
- Falconer, R., P. Newman & B. Giles-Corti (2010). "Is practice aligned with the principles? Implementing New Urbanism in Perth, Western Australia". Transport Policy, 17: 287-294.

Forsyth, A. (2005). "Grading the Irvine Ranch". Planning, 71 (5): 36-39.

Frece, J. (2005). "Twenty Lessons From Maryland's Smart Growth Initiative". Vermont Journal of Environmental Law, 6: 106-132.

- Gordon, D. & S.Vipond (2005). "Gross Density and New Urbanism: Comparing Conventional and New Urbanist Suburbs in Markham, Ontario." Journal of the American Planning Association, 71(1): 41-54.
- Grant, J.L. & S. Bohdanow (2008). "New urbanism developments in Canada: a Survey". Journal of Urbanism: International Research on Placemaking and Urban Sustainability, 1(2): 109-127.
- Gray, R.C. (2007). "Ten Years of Smart Growth: A Nod to Policies Past and a Prospective Glimpse Into the Future". Cityscape: A Journal of Policy Development and Research, 9 (1): 109-103.

Heydorn, C.A. (2007). "A Proud Legacy, A New Future: Bringing Ottawa's Growth Management Strategy Into the 21st Century". Master's Thesis Project, University of Waterloo. Online: <u>http://uwspace.uwaterloo.ca/bitstream/10012/3320/1/Bring%20Ottawa%27s%20Growth</u> <u>%20Management%20Strategy%20Into%20the%2021st%20Century.pdf</u> (Accessed July 12, 2012).

- Ingram, G.K., A. Carbonell, Y.H. Hong, & A. Flint (2009). *Smart Growth Policies: An Evaluation of Programs and Outcomes*. Cambridge: Lincoln Institute of Land Policy.
- Ingram, G.K. & Y.H. Hong (2009). "Evaluating Smart Growth: State and Local Policy Outcomes". Lincoln Institute of Land Policy. Online: <u>https://www.lincolninst.edu/pubs/dl/1572_860_Smart_Growth_Final_PFR.pdf</u> (Accessed March 31, 2012).
- Knaap, G.J. (2006). "A Requiem for Smart Growth?". National Center for Smart Growth Research and Education, University of Maryland
- Knaap, G.J. & J.W. Frece (2007). "Smart Growth in Maryland: Looking Forward and Looking Back". Idaho Law Review, 43: 445-473.
- Kusek, J.Z. & R.C. Rist (2004). "Ten Steps to a Results-Based Monitoring and Evaluation System". World Bank: Washington, DC.
- Litman, T. (2003). "Evaluating Criticism of smart growth." Victoria, BC: Victoria Transport Policy Institute. Online: <u>http://www.vtpi.org/sgcritics.pdf</u> (Accessed January 19, 2012).
- Murtagh, B. (1998). "Evaluating the Community Impacts of Urban Policy". *Planning Practice and Research*, 13 (2): 129-138.

- Musterd, S. & R. Andersson (2005). "Housing Mix, Social Mix, and Social Opportunities". *Urban Affairs Review*, 40 (6): 761-790.
- Pembina Institute (2005). "Local Implementation of Smart Growth Policies in Ontario". Online: <u>http://www.pembina.org/pub/185</u> (Accessed January 12, 2012).
- Pembina Institute (2007). "Ontario Community Sustainability Report". Online: <u>http://www.pembina.org/pub/1512</u> (Accessed January 19, 2012).
- Podobnik, B. (2002). "The Social and Environmental Achievements of New Urbanism: Evidence from Orenco Station." Portland, OR: Department of Sociology, Lewis & Clark College.
- Royal Town Planning Institute (2008). "Measuring the Outcomes of Spatial Planning in England Proposed Planning Outcome Indicators".
- Seasons, M. (2002). "Evaluation and Municipal Urban Planning: Practice and Prospects". *The Canadian Journal of Program Evaluation*, 17 (1): 43-71.
- Seasons, M. (2003). "Monitoring and Evaluation in Municipal Planning: Considering the Realities". Journal of the American Planning Association, 69 (4): 430-440.
- Shen, Q. & F. Zhang (2007). "Land-use changes in a pro-smart-growth state: Maryland, USA". *Environment and Planning A*, 39: 1457-1477.
- Smart Growth BC (No date). "About us: What is Smart Growth?". Online: <u>http://www.smartgrowth.bc.ca/AboutUs/tabid/56/Default.aspx</u> (Accessed October 20, 2010).
- Song, Y. (2005). "Smart Growth and Urban Development Pattern: A Comparative Study." *International Regional Science Review*, 28 (2): 239-265.
- Southworth, M. (1997). "Walkable Suburbs? An Evaluation of Neotraditional Communities at the Urban Edge." Journal of the American Planning Association, 63 (1): 28-44.
- Talen, E. (1996a). "After the plans: methods to evaluate the implementation success of plans". *Journal of Planning Education and Research*, 16: 79-91.
- Talen, E. (1996b). "Do plans get implemented? A review of evaluation in planning". *Journal of Planning Literature*, 10 (3): 248-259.
- Talen, E. & G. Knaap (2003). "Legalizing Smart Growth : An Empirical Study of Land Use Regulation in Illinois". Journal of Planning Education and Research, 22: 345-359.

- Tomalty, R. & D. Alexander (2005). Smart Growth in Canada: Implementation of a Planning Concept. External Research Program, Canadian Mortgage and Housing Corporation. Online: <u>http://www.smartgrowth.ca/research/Smart%20Growth%20in%20Canada-</u> Implentation%20of%20a%20Planning%20Concept.pdf (Accessed October 14, 2011).
- Waldner, L.S. (2004). "Planning To Perform: Evaluation Models For City Planners". *Berkeley Planning Journal*, 17 (2004): 1-28.
- Winfield, M.S. (2003) "Smart growth in Ontario: The Promise vs. Provincial Performance". Pembina Institute. Online: <u>http://dspace.cigilibrary.org/jspui/bitstream/123456789/22311/1/Smart%20Growth%20in</u> <u>%20Ontario%20The%20Promise%20vs%20Provincial%20Performance.pdf?1</u> (Accessed June 2, 2012).
- Winfield, M.S. & G. Jenish (1999). "Ontario's Environment and the Common Sense Revolution: A Four Year Report". Canadian Institute for Environmental Law and Policy. Online: <u>http://www.cielap.org/pdf/csr4.pdf</u> (Accessed June 2, 2012).

List of Interviewees

- Bruce Finlay. Senior Planner, Planning and Growth Management Department, City of Ottawa. Email correspondence, June 6, 2012.
- Anna Hercz. Senior Planner, Planning and Growth Management Department, City of Ottawa. Inperson interview, March 12, 2012.
- Alain Miguelez. Program Manager Development Review Process (Urban), Planning and Growth Management Department, City of Ottawa. In-person interview, May 18, 2012.

Appendix

ETHICS REVIEW APPROVAL FROM MCGILL'S RESEARCH ETHICS BOARD

🐯 McGill

Research Ethics Board Office James Administration Bldg, room 429 845 Sherbrooke St West Montreal, QC H3A 0G4 Tel: (514) 398-6831 Fax: (514) 398-4644 Ethics website:www.mcgill.ca/research/researchers/compliance/human/

Research Ethics Board I Certificate of Ethical Acceptability of Research Involving Humans

REB File #: 334-0312

Project Title: Evaluating Smart Growth Efforts in Ottawa: A Report Card for the Ottawa 20/20 Official Plan

Principal Investigator: Cynthia Jacques

Student Status: Master's Student

Department: School of Urban Planning

Supervisor: Prof. R. Tomalty

This project was reviewed by delegated review.

Par Br

Rex Brynen, Ph.D. Delegated Reviewer, REB I

Approval Period: ____19 Apr. 2012_____ to ____18 Apr. 2013_____

This project was reviewed and approved in accordance with the requirements of the McGill University Policy on the Ethical Conduct of Research Involving Human Subjects and with the Tri-Council Policy Statement: Ethical Conduct for Research Involving Humans.

^{*} All research involving human participants requires review on an annual basis. A Request for Renewal form should be submitted 2-3 weeks before the above expiry date.

^{*} When a project has been completed or terminated a Study Closure form must be submitted.

^{*} Should any modification or other unanticipated development occur before the next required review, the REB must be informed and any modification can't be initiated until approval is received.

GENERAL INTERVIEW GUIDE

Note: Due to time constraints and the different roles of each interviewee, not all questions were asked to each interviewee.

General:

- 1. Briefly describe your role in the development, implementation, and/or monitoring and evaluation of the Ottawa 20/20 Plan.
- 2. In reviewing the Ottawa 20/20 Official Plan, I noticed that some targets become more specific or change over time in the 2003, 2007 and 2011 consolidations of the plan (e.g., intensification targets, modal share targets).
 - How does this affect plan implementation? Monitoring and evaluation?
- 3. What is the connection between the Ottawa 20/20 Growth Management Strategy and the Choosing our Future plans (which focus now on the entire NCR)? Do the new Choosing our Future plans work in conjunction with local municipal official plans (for the City of Ottawa and the City of Gatineau, respectively)?
- 4. What is the general perception of the Ottawa 20/20 initiative today, 8 years after the adoption of the plan? How does this perception affect the implementation and monitoring the progress of the plan today?

Implementation:

- 5. For the following sub-questions, please refer to the attached "Research Focus" document:
 - a) What Smart Growth elements of the plan do you think get the *most* attention and resources in terms of implementation?
 - b) What Smart Growth elements of the plan do you think get the *least* attention and resources in terms of implementation?
- 6. What would you say are the main implementation challenges for the Ottawa 20/20 Plan or for Smart Growth plans in general? Based on your experience with the Ottawa 20/20 initiative, how would you suggest overcoming these barriers in the future?

- 7. Discussion of plan outcomes to date, to provide insight on the results of my analysis (*We will discuss this further during our interview*)
- 8. What lessons can be drawn from the Ottawa 20/20 initiative with regard to Smart Growth planning implementation?

Monitoring & Evaluation:

9. Policy 5.5.1 of the Official Plan states that:

"The City will implement an Official Plan monitoring program consisting of targets, indicators, surveys and research to assess changing conditions and performance on matters related to the Official Plan."

- a) Was this program ever developed further?
- b) What were the main challenges or barriers to implementing this program?
- 10. What are the main factors that most <u>impede</u> plan monitoring and evaluation (e.g., resource constraints, absence of political support)?
- 11. What are the main factors that would help to <u>facilitate/enable</u> plan monitoring and evaluation (e.g., more staff, time, appropriate expertise)?
- 12. Based on your experience, do you think that more resources should be dedicated to the monitoring and evaluation of plan implementation?
- 13. Do any of the employees in your department have any formal training in monitoring and evaluation?

SMART GROWTH PRINCIPLES DEFINED BY ORGANIZATIONS

SMART GROWTH BC

Source: <u>http://www.smartgrowth.bc.ca/Default.aspx?tabid=133</u>

- 1. Mix land uses
- 2. Build well-designed compact neighbourhoods
- 3. Provide a variety of transportation choices
- 4. Create diverse housing opportunities
- 5. Encourage growth in existing communities
- 6. Preserve open spaces, natural beauty, and environmentally sensitive areas
- 7. Protect and enhance agricultural lands
- 8. Utilize smarter, and cheaper infrastructure and green buildings
- 9. Foster a unique neighbourhood identity
- 10. Nurture engaged citizens

SMART GROWTH ONLINE & U.S. ENVIRONMENTAL PROTECTION AGENCY

Source: <u>http://www.smartgrowth.org/why.php</u>, <u>http://www.epa.gov/smartgrowth/about_sg.htm</u>

- 1. Take Advantage of Compact Building Design
- 2. Create Range of Housing Opportunities and Choices
- 3. Create Walkable Neighborhoods
- 4. Encourage Community and Stakeholder Collaboration
- 5. Foster Distinctive, Attractive Communities with a Strong Sense of Place
- 6. Make Development Decisions Predictable, Fair and Cost Effective
- 7. Mix Land Uses
- 8. Preserve Open Space, Farmland, Natural Beauty and Critical Environmental Areas
- 9. Provide a Variety of Transportation Choices
- 10. Strengthen and Direct Development Towards Existing Communities

SMART GROWTH CANADA NETWORK

Source: <u>http://www.smartgrowth.ca/home_e.html</u>

- 1. Housing Choice
- 2. Vibrant, Walkable Complete Communities
- 3. Smart Building Design
- 4. Renew Existing Communities
- 5. Green Infrastructure
- 6. Green Space, Farmland and Ecologically Sensitive Areas
- 7. Broad-Scale, Integrated Planning
- 8. Transportation Options
- 9. Community Involvement
- 10. Focus on Implementation

SMART GROWTH AMERICA

Source: <u>www.smartgrowthamerica.org</u>

- 1. Neighbourhood livability
- 2. Better access/less traffic
- 3. Enabling pre-existing cities, suburbs, and towns to thrive
- 4. Shared benefits
- 5. Lower costs/lower taxes
- 6. Preserving open space

SIERRA CLUB

Source: http://www.sierraclub.org/sprawl/community/smartgrowth.asp

- 1. Livable communities
- 2. Closeness to nature
- 3. Viable public transit
- 4. Revitalization of older suburbs and downtowns, and rundown commercial areas
- 5. Urban growth boundaries
- 6. Long term visions

SMART GROWTH GATEWAY

Source: <u>http://www.smartgrowthgateway.org/goals.shtml</u>

- 1. Mix land uses
- 2. Utilize existing community assets
- 3. Create a range of housing opportunities and choices
- 4. Create walkable, compact neighborhoods
- 5. Promote distinctive, attractive communities with a strong sense of place
- 6. Preserve open space, farmland, natural beauty, and critical environmental areas
- 7. Strengthen and encourage growth in existing communities
- 8. Provide a variety of transportation choices
- 9. Make development decisions predictable, fair, and cost-effective
- 10. Encourage citizen and stakeholder participation in development decisions

ADDITIONAL TABLES

Table A1. A summary of key evaluation studies examined in the literature reviewand commonly used indicators relevant to this research project

STUDIES EXAMINED	COMMONLY USED INDICATORS			
Smart Growth				
Cambridge Systematics Inc., 2004 Brunt & Winfield, 2005 Song 2005 Tomalty & Alexander, 2005 Chen, 2008 Ingram et al., 2009	 Residential density Employment density Population density Developed land per capita Development location/type Land use mix or Land use shares Intensification Transportation options Mode Share Annual transit trips per capita Vehicle miles travelled Vehicle ownership Housing mix or Share of housing types Change in area of agricultural/resource lands Change in area of parkland Employment directed to designated centres Street design elements/connectivity Accessibility measures 			
New Urbanism				
Gordon & Vipond, 2005 Grant & Bohdanow, 2008 CMHC, 2010 Falconer, Newman & Giles-Corti, 2010	 Land use mix Housing mix or Share of housing types Gross or net residential density Development location/type Residential lot size Accessibility measures Street design elements/connectivity Sidewalk coverage Percent greenspace/open space Mode share/split Commuting/trip distance 			

STUDIES EXAMINED (CONT'D) RELEVANT COMMON INDICATORS

Transit Oriented Development	
Bae, 2002 Podobnik, 2002 Brinklow, 2010	 Transit ridership Vehicle ownership Vehicle miles travelled Housing mix or Share of housing types Land use mix Residential density Employment density
Community Sustainability and Other	Plans
Berke et al., 2006 Pembina Institute, 2007 Royal Town Planning Institute, 2008	 Population density Employment density Land use mix Urban intensification Roadway length Street connectivity Mode share Commuting distance Housing mix Change in area of park and recreational space (absolute and per 1,000 population) Loss of sensitive or protected land

MIXED-USE CENTRE	TRAFFIC ZONE IDS		
Baseline-Woodroffe	2180, 2190, 2272, 2611		
Billings Bridge	1620		
Blair	1270, 1280, 1451		
Bayview-Carling-Preston	631, 632, 642, 652		
Confederation Heights	1660, 1670		
Cyrville	1100		
Kanata-West	5160, 5170		
Lees	N/A (too few jobs)		
Mer Bleue	N/A (too few jobs)		
Trainlands	1400, 1410, 1461		
Tunney's Pasture	2452, 2460		
Kanata Town Centre	5044, 5051, 5301, 5302, 5311		
Orleans Town Centre	3121		
South Nepean Town Centre	4310		

Table A2. Traffic zones used to determine number of jobs in each designatedMixed Use Centre

CATEGORY FOR ANALYSIS	Land Use Fields Included						
2005							
Residential	R1	R2	R3	R4	R5		
Commercial	C1	C2	СОМ				
Employment & Economy	M1	M2	QS	I1	I2		
	I3	I3-r	I4	15	OF		
Recreation	RE-A	RE-A-s	RE-P	RE-P-s			
2010							
Residential	R1	R1-L	R2	R3	R3-S		
	R4-X	R4	R5				
Commercial and Office	C1	C2	C3				
Employment & Economy	M1	M2	QS	I1	I2		
	I3	I3-r	I4	15	OF		
Recreation	RE-A	RE-A-s	RE-P	RE-P-s			

Table A3 Categories from the 2005 & 2010 City of Ottawa Land Use Surveyused in the analysis of land use mix

Additional Figures



Source: City of Ottawa, 2005

Figure A1. Screenlines used in the City's Annual Classification and Occupancy Count Program



Figure A2. Designated Mixed Use Centres in the City of Ottawa