

PLANNING SUSTAINABLE SUBURBAN COMMUNITIES IN CALGARY: EVALUATION AND REPORTING FRAMEWORK

Cities, Policy & Planning
research series



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1.0 The Sustainable Suburban Communities Research Project

The agenda for this research project was developed in collaboration with the City of Calgary planning staff participating in the formal Sustainable Suburbs Study Review. The project purpose and objectives have been tailored according to the research needs of the City of Calgary's Sustainable Suburbs Study Review team. The research is designed to assist the City's planning team in their analysis and evaluation of the effectiveness and efficiency of planning policies directed at more sustainable growth management in the new communities of Calgary through exploration of new community development.

The research report is organized in three parts. The first chapter highlights the purpose, objectives and methodology. The evaluation approach and the development of the evaluation framework are also discussed. Chapter two profiles the indicators applied in measuring and evaluating new community development performance with respect to the Sustainable Suburbs Study policies. Finally, chapter three outlines the application of the evaluation framework to a sample of newly developed communities in Calgary. Performance summaries are provided for each case community.

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1.1. The Sustainable Suburbs Study

The location, type and form that growth assumes in cities impact the potential for fiscally, environmentally and socially sustainable practices. Growth management strategies that incorporate sustainable new community development practices can reduce the costs associated with growth and promote more livable communities (Smart Growth Network, 2003). The City of Calgary has adopted a number of high-level directive policies to promote the implementation of sustainable principles through land use planning. Such principles are apparent in the *Calgary Transportation Plan* ("CTP"), and the *Calgary Municipal Development Plan* ("Calgary Plan"). These policy plans highlight Council's strategic priorities for both land use planning and transportation and further guide tactical policies.

In 1995 the City of Calgary adopted the *Sustainable Suburbs Study* ("SSS") to expand on high-level policy that directly relates to suburban development. The SSS aimed to encourage developers, city departments and other stakeholders to develop more sustainable communities (City of Calgary, 1995b, p. iii). In the SSS the components of sustainability in relation to new community development are defined as:

- *Fiscally*, the cost of building, operating and maintaining new communities and their supportive infrastructure and services are affordable, having regard to other spending priorities, and will not become a burden on future generations;
- *Socially*, communities are designed to be socially diverse, adaptable to changing lifestyles and to further the objective of providing all Calgarians with access to

- affordable housing, education, health care, essential goods, public amenities and services, such that their basic needs are met; and
- *Environmentally*, communities are designed to minimize air, water, and soil pollution, reduce resource consumption and waste, and protect natural systems that support life. (City of Calgary, 1995b, p. 3)

The SSS was a tool used to introduce alternative practices in land use planning and development for new communities. The practices intended to enhance the ability of new communities to be sustained farther into the future fiscally, socially and environmentally. (City of Calgary, 1995b, p. 3).

The SSS was a pivotal document in the history of land use planning in Calgary. The SSS serves as a means to integrate land use planning with transportation planning in the City. The plan proposed a land use framework for new community development in sync with the *CTP*. These policy documents influenced the *Calgary Plan* in 1998 and therefore represent and support city-wide sustainability objectives.

The SSS document states that the planning policies of the *CTP* and *the SSS* “represent a departure from the previous approach to planning new communities in Calgary” (1995b, p. 1). It was considered paramount to both survey and evaluate its implementation in new communities through a set of sustainability indicators. These indicators could be used to verify the possible existence of a say-do gap and to revise performance standards if necessary in order to achieve the intended policy outcomes. A monitoring plan report was prepared in 1997 by the City of Calgary’s Planning & Building Department but never actually applied in practice.

There has been no formal monitoring of the performance of the SSS policies in practice to date. Now as the SSS comes under review the ex-post evaluation process seeks to provide an understanding of the extent of the gap between the SSS policy objectives and the developed new communities in Calgary. Insight gained from the evaluation can inform the policy review and further enhance new community policy towards achieving sustainable communities.

1.2. Purpose and Objectives of the Research

The purpose of the research is to identify and gain knowledge about compliance in the development of new communities in Calgary with the policy of the SSS. The project proposes a sustainability evaluation framework, drawing on the main sustainability objectives and policies in the SSS. Applying the evaluation framework to newly developed communities in Calgary highlights the existence and significance of the performance gap between policy and the built environment.

This research project is concerned with the effectiveness of land use policy as a tool to implement sustainable suburban design and development. More specifically it has the following objectives:

1. To develop a framework for evaluating the implementation of *the SSS* policies.
2. To apply the evaluation framework to a sample of communities and determine the gap between the objectives in *the SSS* and the development outcomes.

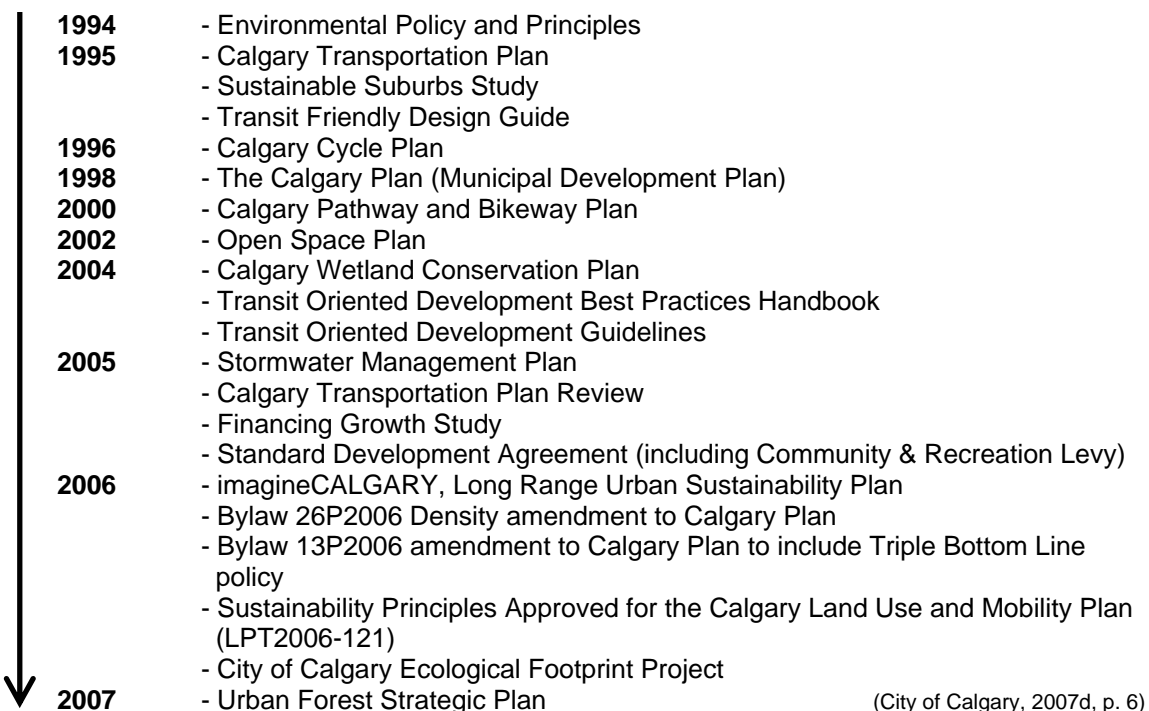
The methodology includes a literature and policy review, environmental scan, evaluative framework development, and case study analysis. A literature review and policy document review inform the development of the evaluation framework. An environmental scan explores the fiscal, institutional, environmental and social trends that have affected the implementation of existing sustainable suburban design and development strategies. A case study approach is utilized to apply the evaluation framework in order to provide indicator measures and outcome ratings that inform community report cards. The community report cards provide a rating evaluation according to outcomes and sustainability themes.

1.3. Policy Plan Implementation Context

In Calgary, the new community land use planning process begins with the preparation of an Area Structure Plan (ASP). Actual implementation is triggered by an application from the land owner or representative for land use redesignation. Various public and private realm factors influence the application of the SSS and are recognized as policy is not implemented in isolation.

In the past five years a significant shift in Calgary's housing affordability has indicated a need for a wider range of housing types and price ranges other than the traditional single-family home. Increasing public awareness and concern regarding climate change and various social and environmental issues has promoted citizen-based organizations and movements concerned with the livability and quality of life of cities. Lastly, since adoption of the SSS numerous Calgary City Council policies and initiatives have been undertaken that emphasize sustainability in the built environment (City of Calgary, 2007d).

Figure 1. Timeline of City of Calgary Policy Context and Council Initiatives



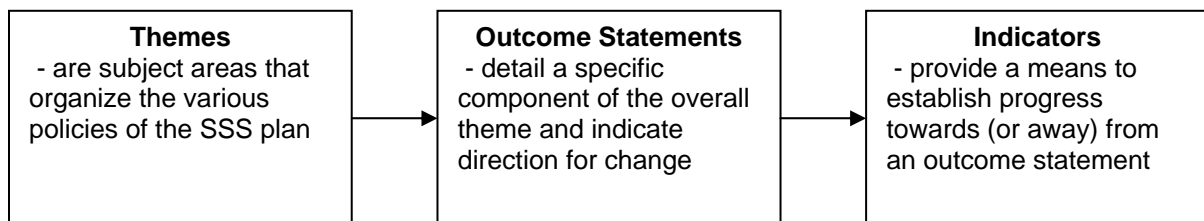
1.4. Evaluation Framework

Policy evaluations can occur at various points of policy formation and application. These evaluations consider different aspects of the policy for decision-making purposes. This research project is an ex-post policy evaluation with a particular emphasis on outcome based performance. The research takes place after the policy has been applied to determine the gap that exists between policy and the built environment. The evaluation is concerned with the outcomes of the plan. In addition to indicating whether objectives are or are not being met ex-post research aims to provide some insight about policy issues affecting outcomes, and determining whether the policy should be continued, modified, or terminated (Patton and Sawicki, 1986, p. 305).

An evaluation framework is developed to analyse the degree of compliance, or the magnitude of the performance gap between *the* SSS policies and development in new communities. The evaluative framework content is derived from the goals, objectives and policies of *the* SSS (Refer to Appendix A for SSS Policies). The goals and objectives were categorized into sustainability themes by which the plan implementation is ultimately rated in the report card. Due to the number of policies and the overlapping nature of the policy intentions the researcher synthesized the policies into outcome statements that identify the direction for change. The outcome statements are categorized into sustainability theme clusters.

The performance in the clusters is evaluated through the application of indicators. Indicators are developed to measure the achievement of the intended outcomes and based on the performance criteria set out in the SSS (Refer to Appendix B for SSS Performance Criteria). The indicator measures are then translated into a rating representing the degree of performance.

Figure 2. Evaluation Framework



(Derived from Skeith, 2002, p. 7.)

Each outcome statement identified in the development of the framework is associated with measurable indicators. The indicators selected are based on a number of existing evaluation frameworks for sustainability evaluation at the community or neighbourhood level. The formative frameworks were discovered in the literature review stage. Indicators from these frameworks are analysed and synthesized to reflect the criteria and targets included in the SSS. The formative sustainability evaluation frameworks include: Monitoring the Effectiveness of the Sustainable Suburbs Study (City of Calgary, 1997a), the Framework for Evaluation: Garrison Woods Community Plan (Skeith, 2002), Sustainability Evaluation Framework for the Greenwich Millennium Village Project (Kim, 2005), the LEED for Neighbourhood Development Rating System (U.S. Green Building Council, 2007), and the Emerald Hills Urban Village Goals, Indicators and Targets (Strathcona County, 2007).

The selection of indicators is restricted by data availability. However, indicator assessment also considered the criteria of relevance, logical interpretation, reliability and manageability (Wong, 2006; Sustainable Seattle, 1998). The criteria are defined as:

Data availability: Data exists and is accessible, or a practical method of data collection or measurement exists or can be created, to make data accessible in a reasonable timeframe.

Relevance: The indicators meet the purpose to provide information about the outcomes under study.

Logical Interpretation: A reasonable rationale exists for using the indicator. A clear relationship exists relating the indicator outcome back to the objective under study.

Reliable: Indicator measures are repeatable.

Manageable: The indicator provides the necessary information at a level that provides quality detail. A balance is met where there is enough information to complete a thorough analysis, but not too much information which can overwhelm and convolute the analytical process.

A rating method is applied to the indicator structure to simplify the indicator data into a simple set of scores. Each indicator is measured and then the result is translated into a rating between zero and three. The rating specifications for each indicator are derived from performance targets set out in the SSS policy.

The partial rating for each outcome is determined from the indicator ratings. Though the number of indicators associated with each outcome statement varies, the related indicators are assumed to be of equal value in determining the outcome statement partial rating. Unitary weighting is applied and the mean indicator rating is the outcome statement partial rating.

Table 1 – Indicator Rating Table Example

Outcomes	Indicators	Individual Indicator Ratings				Partial Rating
		0	1	2	3	
#1: Outcome Statement	Indicator 1.1				λ	3
#2: Outcome Statement	Indicator 2.1	λ				2
	Indicator 2.2				λ	
	Indicator 2.3			λ		
#3: Outcome Statement	Indicator 3.1	λ				1
	Indicator 3.2		λ			
#4: Outcome Statement	Indicator 4.1		λ			1

The evaluation framework supports a comprehensive review of community design by incorporating the range of interrelated elements that contribute to sustainability. The report card marks the degree of plan implementation by sustainability theme based on a composite rating derived from the results of the case study outcome evaluations. A composite rating out of a total of 12 for each sustainability theme indicates the extent of

policy implementation. The composite rating is derived by adding the partial ratings, from zero to three, of the outcome statements in each theme cluster. Each outcome statement is weighted equally in the composite rating. Analysis and interpretation of the community report cards identifies and defines the implementation successes and gap according to the SSS sustainability themes.

Table 2 – Score Card Example

Theme	Outcomes	Partial Rating	Composite Rating
Theme			
	#1: Outcome Statement	3	7
	#2: Outcome Statement	2	
	#3: Outcome Statement	1	
	#4: Outcome Statement	1	

2.0 Sustainability Indicators

The indicator development process entailed the review of various community-scale evaluation frameworks and their related indicators. The indicator targets are based on the performance criteria set in the SSS. The use of indicators provides a quantitative evaluation of the policy outcomes. The compilation of the indicator related ratings by outcome and then sustainability theme provide a comprehensive overview of the progress on the sustainability objectives of the SSS.

2.1. Indicator Profiles and Indicator Rating Scales

Each policy outcome has related indicators to measure and evaluate the extent of compliance to the plan. The rating system indicates the extent of implementation by translating the indicator measures to a rating between zero and three.

- 0 - Is a null value signifying that there was no performance related to the indicator.
- 1 - Signifies limited performance, in which some progress is evident however lower than the projected targets.
- 2 - Signifies good performance, in which minimum performance targets are met or slightly exceeded.
- 3 - Signifies high performance, performance exceeds minimum targets.

Following is a profile of each indicator in relation to the intended outcomes under evaluation and the rating system associated with the indicator requirements.

Outcome #1: Achieve a minimum density of 7 units per gross acre (17.3 units per gross hectare).

Indicator: Residential Unit Density

Sustainability Concept: Residential intensification is a means to increase the use of particular land areas, with the intention of reducing the overall amount of land consumption.

Requirement: Minimum residential unit density of 7 units per gross acre

Unit of Assessment: Dwelling units, gross acres

Rating: The rating for the density indicator signifies an increase, and extent of that increase, from the average unit density in 1995.

Community Average Unit Density Rating			
< 5.5 upa	5.5 - < 7.0 upa	7.0 upa - 8.5 upa	> 8.5 upa
0	1	2	3

Policy Relevance: 7 units per gross acre was the higher end of the density range incorporated in most ASPs in the 10 years prior to the SSS. The average density over the same period was 5.5 units per acre (City of Calgary, 2006d, p. 34). A density of 7 upa became the target on which the policies in the CTP are based and in turn the target density in the SSS (City of Calgary, 1995b, p. 46).

Outcome #2: Increase the accessibility, comfort and safety of public transportation.

Indicator: Locating transit network, transit stops and regional transit facilities in the ASP

Sustainability Concept: Convenient and efficient travel and public transit requires that routes are as direct as possible to community focal points. Transit stops should be located near areas of concentrated potential riders. Early transit planning can provide for coordination of transit with land use and form. Regional transit facilities should be coordinated with primary activity areas in the early planning stages.

Requirement:

- ASP illustrates transit route
- ASP illustrates transit stop locations
- ASP indicates regional transit facilities at the community core

Unit of Assessment: transit route, transit stops, regional transit facilities

Rating: The indicator rating signifies the extent of transit planning at the ASP stage.

Transit Planning Rating			
No requirements included in ASP	One requirement included in ASP	Two requirements included in ASP	All requirements included in ASP
0	1	2	3

Policy Relevance: To consider transit planning early in the planning process as a foundational element of the plan around which further development would be organized. Transit routes and stops were to be determined at the initial planning stages to coordinate them with the structure of focal points and higher density residential developments.

Indicator: Proportion of dwelling units within 400 metres of the transit network

Sustainability Concept: Accessibility to the transit network and stops is an important factor in attracting a significant number of transit riders. Accessibility and convenience of public transit to residents is enhanced by providing transit stops within a reasonable walking distance from dwelling units. Accessible public transit should correlate to increased transit ridership, and in turn lower the City's operating cost per passenger.

Requirement: 85% of dwelling units are within 400 m of a transit stop

Unit of Assessment: dwelling units, metres

Rating: The rating indicates if development complies with the explicit accessibility target.

Transit Network Access Rating			
< 50% of population within 400 m	50% - 84% of population within 400 m	85% - 94 % of population within 400 m	95% - 100% of population within 400 m
0	1	2	3

Policy relevance: The guidelines for the distance between dwelling units and a transit stop are based on a desire to have as many residents as possible within a comfortable five minute walk (defined as 400 m) of transit service in support of the CTP objectives (City of Calgary, 1995b, p. 55).

Indicator: Transit stop quality

Sustainability Concept: To promote transit use and reduce private automobile trips from the community, transit use should be made as safe and comfortable as possible. This can be achieved by providing quality transit stops that include attractive shelters, seating and other amenities for transit users.

Requirement: Provide a number of amenities at the community core and neighbourhood nodes' transit stops

Unit of Assessment: shelter, seating, access to loading/unloading zones, telephones, lighting, bicycle storage, newspaper kiosks

Rating: Represents the scope of quality in transit stops by identifying the number of suggested amenities present at core and node transit stops. The scale is based on the average number of amenities located at all of a community's core and node transit stops.

Transit Stop Quality Rating			
No amenities	2 amenities	4 amenities	6 or more amenities
0	1	2	3

Policy Relevance: Community cores and neighbourhood nodes should function as transit hubs. These are key transit stop locations with enhanced transit waiting environments. They should provide: shelter and seating for pedestrians, convenient passenger loading/unloading zones, telephones, adequate lighting, secure bicycle storage and kiosks (City of Calgary, 1995b, p. 54).

Outcome #3: Achieve shared use of sites and/or buildings for public facilities and services.

Indicator: Shared use of sites and/or buildings

Sustainability Concept: The funds available for the capital, maintenance and operating costs of public facilities and services do not allow for the timely provision, and then operations and maintenance of all public facilities and services in new communities. Coordinating multi-use sites and/or buildings can provide cost-savings as well as land efficiencies for such facilities and services through shared parking, shared/lower construction and maintenance costs, and peak use time management of facilities.

Requirement: Incorporate sites and/or buildings shared for public facilities and services

Unit of Assessment: multi-use sites, multi-use buildings

Rating: Represents the actual development (or not) of sites or buildings for multiple uses.

Site and Building Use Efficiency

No multi-use sites or buildings	1 site/ building with 2 shared uses	1 site/ building with 3 shared uses	4 or more uses sharing 1 or more sites/ buildings
0	1	2	3

Policy relevance: The shared use of land or buildings can assist to more efficiently provide facilities and services by sharing the land, construction and maintenance costs over more users.

Outcome #4: Increase home occupations.

Indicator: Number of design elements tailored for home occupations

Sustainability Concept: Home occupations can provide flexible work options for residents and reduces the number of work trips made outside of the community, particularly reducing downstream traffic congestion and peak hour vehicle emissions.

Requirement: Incorporate any number of design elements specific to home occupations

Unit of Assessment: live-work type dwellings, neighbourhood business mail drops, communal parking areas

Rating: Represents the extent to which design accommodates home occupations.

Home Occupations Rating			
No design elements	1 design element	2 design elements	3 or more design elements
0	1	2	3

Policy Relevance: Home occupations promote the community to become more than just a housing-base while reducing the number of work trips made outside of the community. More home occupations increases the number of residents and workers present in the community throughout the day and provides an all-day market for local commercial areas (City of Calgary, 1995b, p. 29).

Outcome #5: Increase accessibility to mixed use activity centres.

Indicator: Distance of community core from regional shopping centre

Sustainability Concept: To provide for residents' daily needs within the community. Providing local retail and professional services reduces the need to travel longer distances outside of the community by private automobile and encourages walking and cycling to such local amenities.

Requirement: Greater than 3.2 km travel distance to the nearest regional shopping centre

Unit of Assessment: kilometres

Rating: Signifies compliance with the distance requirement.

Community Core Location Rating			
No community core	Located < 3.2 km from regional shopping centre	Located 3.2 km – 4.0 km from regional shopping centre	Located > 4.0 km from regional shopping centre
0	1	2	3

Policy Relevance: Community cores need to entail significant retail and commercial services in order to attract residents to use these facilities versus driving to regional centres outside of the community. The composition and vitality of community cores is

affected by the competition from regional shopping centres. It is important to locate regional shopping centres at an adequate distance from community activity centres in order to promote local patronage of community retail and services (City of Calgary, 1995b, p.22).

Indicator: Ratio of commercial development per resident

Sustainability Concept: Ensuring an amount of commercial development within a community allows for the residents' needs to be satisfied locally.

Requirement: Provide a minimum of 1 m² of commercial development per resident within the community

Unit of Assessment: square meters of commercial development, total residents

Rating: Represents compliance with the area minimum requirement.

Amount of Commercial Development Rating			
No commercial development	0.01 - .99 m ² commercial development per resident	1 – 1.99 m ² of commercial development per resident	2 or more m ² of commercial development per resident
0	1	2	3

Policy Relevance: A significant amount of commercial services are required within the community to meet people's needs locally. A minimum of one square metre of commercial development should locate within the community core and nodes.

Indicator: Proportion of residents within 400 m of community commercial amenities

Sustainability Concept: Locating the community core within walking distance of the greatest percentage of residents enhances the potential that residents will access the facilities and services located at the core by walking or cycling.

Requirement: Majority of residents within 400 m of community commercial amenities

Unit of Assessment: residents, metres

Rating: Represents the proportion of residents within the recommended distance.

Accessibility to Commercial Amenities Rating			
< 50% of residents within 400 m of commercial amenities	50% - 84% of residents within 400 m of commercial amenities	85% - < 95% of residents within 400 m of commercial amenities	95% or more of residents within 400 m of commercial amenities
0	1	2	3

Policy Relevance: It is recommended that the communities' core is centrally located in order to act as a focal point and to make it accessible to the greatest amount of residents.

Outcome #6: Achieve a significant mix of uses in the community core and neighbourhood node developments.

Indicator: Mix of public and private uses

Sustainability Concept: The key to community core and nodes' viability is a range and mix of uses to attract residents to the site for a variety of purposes. In addition to the commercial component, other public uses such as open space, schools, public services, a transit stop, and a community facility can provide a critical commercial and public mix that becomes a focal point within the community (City of Calgary, 1995b, p. 26). The

range of activities located in cores and nodes is important to reducing the need to drive outside of the community, and in turn the length of automobile trips as well as the potential of using alternative travel modes like walking and cycling.

Requirement: Number of public and private uses located at the core and nodes

Unit of Assessment: list of diverse uses

Rating: Signifies the extent of the mix of uses located at the core and nodes. A rating is provided for the core and another for the nodes. The node scale is based on the average number of uses located in the community's nodes.

Community Core Mixed Use Rating			
2 Uses	4 Uses	7 Uses	10 Uses or more
0	1	2	3

Neighbourhood Node Mixed Use Rating			
0 Uses	2 Uses	4 Uses	7 Uses or more
0	1	2	3

Policy Relevance: A mix of uses promotes the viability of the core and nodes. A significant combination of uses enhances the ability for residents to complete multi-purpose trips within the community.

Outcome #7: Increase the variety of housing types in addition to single-family type dwellings.

Indicator: Proportion of dwelling units that are multi-family units

Sustainability Concept: Housing choice is important in developing a community that provides for different household types, income levels and age groups.

Requirement: 20% - 60% of dwelling units should be multi-family units

Unit of Assessment: triplex, fourplex, townhouses, and apartment-style units, total dwelling units

Rating: Identifies degree of compliance with the target range.

Housing Type Rating			
< 20% multi-family dwellings	20% - < 40% multi-family dwellings	40% - 60% multi-family dwellings	> 60% multi-family dwellings
0	1	2	3

Policy Relevance: A mix of housing types can provide a means for the higher density characteristic of a sustainable community and provide options in housing choice for residents.

Indicator: Proportion of dwelling units that are potential affordable housing units

Sustainability Concept: Sustainable community design should provide opportunities for households of various economic circumstances to live in the community.

Requirement: Proportion of potential affordable housing units

Unit of Assessment: senior citizens projects, mobile homes, secondary dwellings, rental apartments, defined affordable housing projects (City of Calgary, 2007c, p.12)

Rating: Represents the inclusion of potential affordable housing units.

Affordable Housing Rating			
0%	1-9%	10% -14% of	15% or more

0	1	2	3
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Policy Relevance: The SSS recommended that policies and guidelines be developed as part of a new comprehensive package on affordable housing (City of Calgary, 1995b, p. 48). The target of 10% of community units as affordable housing units was an interim target recommended in the SSS to direct development prior to the completion of the formal city-wide program.

Outcome #8: Increase accessibility of multi-family development to activity centres.

Indicator: Proportion of multi-family units located within 400 m of commercial activities
Sustainability Concept: Locating multi-family development in close proximity to the amenities of the core and nodes increases the accessibility of the services to a higher proportion of dwelling units. In turn increasing the potential for these facilities and services to be frequented by residents living in walking and cycling distance.

Requirement: Majority of multi-family units located within 400 m of commercial activities

Unit of Assessment: triplex, fourplex, townhouse and apartment-style units, metres

Rating: Indicates the proximity of multi-family development to the commercial amenities located in the core or nodes.

Multi-family Location Rating			
No multi-family developments	< 50%	50% - 74%	75% - 100%
0	1	2	3

Policy Relevance: The core and nodes should develop as focal points around which higher density residential developments are located. A graduated density pattern is recommended, locating the higher density development at the core and nodes.

Outcome #9: Increase accessibility for pedestrians and cyclists within activity centres.

Indicator: Proportion of parking spaces located to side or rear of the site

Sustainability Concept: Community core sites should have side or rear parking whenever possible in order to enhance the pedestrian street environment by avoiding pedestrian-unfriendly gaps. To allow choice for residents and achieve the important objective of reducing the need to drive within the community, the community core site design needs to encourage and accommodate modes of travel other than the car (City of Calgary, 1995b, p. 29).

Requirement: Locate majority of off-street commercial parking to side or rear of commercial buildings

Unit of Assessment: off-street commercial parking spaces

Rating: Signifies the degree to which parking design has changed from standard to better accommodate pedestrians and cyclists.

Parking Rating			
No parking located to rear or side	< 50% located to rear or side	50% - 74% located to rear or side	75% - 100% located to rear or side
0	1	2	3

Policy Relevance: To make the community cores and neighbourhood node site designs more pedestrian and cyclist-oriented in order to promote access by such forms of travel.

Indicator: Proportion of retail access points fronting the street

Sustainability Concept: Building setbacks and access points should be located and designed in a manner that is oriented to pedestrian accessibility to promote alternative travel modes other than the private vehicle. Convenient access for pedestrians, cyclists and transit users promotes the core as a local destination rather than an auto-oriented stop (City of Calgary, 1995b, p. 26).

Requirement: Majority of retail access points in community core front the street with direct access from sidewalks

Unit of Assessment: retail access points

Rating: Signifies the street-oriented design of commercial buildings.

Commercial Building Street-orientation Rating			
No access points fronting street	< 50% front street	50% - 74% front street	75% - 100% front street
0	1	2	3

Policy Relevance: The site design of the community core should encourage the use of community core activities by pedestrians, transit-users and cyclists through street-oriented design.

Outcome #10: Increase the quality of street patterns and design for pedestrians, cyclists and transit-users.

Indicator: Incidence of 4-way intersections

Sustainability Concept: The grid or modified-grid pattern is accepted as a street pattern that allows for better accessibility for all modes of travel. The pattern provides alternative routes and more direct links to destinations. The proportion of 4-way intersections provides a proxy for grid-like street patterns (Cervero in Skeith, 2002, p. 68).

Requirement: Number of 4-way intersections as compared to the total number of intersections in the community

Unit of Assessment: 4-way intersections, total intersections

Rating: Indicates the extent of connectivity of the street network.

Intersection Rating			
0%	< 50%	50% - 74%	75% - 100%
0	1	2	3

Policy Relevance: Develop a new selection of pedestrian, cyclist and transit-friendly street design. Base the standards on a street layout that provides direct links and offers alternative routes, rather than funneling vehicle traffic onto a limited number of streets (City of Calgary, 1995b, p. 55).

Indicator: Number of through-streets at the community boundary

Sustainability Concept: Few community street entrances results in funneling high levels of automobile traffic on large corridors to provide access to and from the community. Such large road corridors detract from the safety and comfort of the pedestrian environment due to the amount of traffic and width of roadway.

Requirement: Minimum average of one through-street at the community boundary every 400 metres (this does not apply to connections that can not physically be made because of topography, wetlands, etc.).

Unit of Assessment: through-streets at community boundary, community perimeter

Rating: Signifies the extent of permeability of through-streets in/out of the community.

Through-street Rating			
> 650	401 - 650 m	251 m – 400 m	< 250 m
0	1	2	3

Policy Relevance: Offer a street layout that provides alternative routes to various destinations within the community as well as several connections to the surrounding regional road network to avoid concentrating vehicle traffic on few but large roads (City of Calgary, 1995b, p. 51).

Indicator: Number of traffic calming features

Sustainability Concept: Various design features can promote a pedestrian and cyclist-friendly environment by slowing automobile traffic. This enhances the safety and comfort for pedestrians and cyclists.

Requirement: Proportion of intersections with traffic calming features along collector or primary collector streets in the community

Unit of Assessment: speed bumps, rumble strips, curb extension, reduced corner curb radii, on street parking, raised median island, speed bump, textured crosswalk and traffic circle (Skeith, 2002, p. 69)

Rating: To identify the comfort and safety for pedestrians and cyclists.

Traffic Calming Rating			
No features	< 50% with features	50% - 74% with features	75% - 100% with features
0	1	2	3

Policy Relevance: To make walking and cycling safe and comfortable by incorporating features in the street design that moderate vehicle speed (City of Calgary, 1995b, p. 52).

Indicator: Proportion of residential development without front-drive garages

Sustainability Concept: Rear lanes accommodate vehicles at the rear of residential parcels. This enhances the streetscape for pedestrians and cyclists by allowing smaller front setbacks and dwelling designs that frame the street.

Requirement: Proportion of block faces with rear lane access

Unit of Assessment: rear lanes

Rating: Represents the degree of residential development without front-drive garages.

Residential Frontage Rating			
0%	< 50%	50% - 74%	75% - 100%
0	1	2	3

Policy Relevance: Enhance the streetscape by incorporating features such as: buildings which front on the street, porches, front windows, and small front yard setbacks (City of Calgary, 1995b, p. 47). Rear lanes make these forms of residential development possible while still accommodating the automobile.

Indicator: Proportion of block faces with sidewalks

Sustainability Concept: Sidewalks provide safe and comfortable access for pedestrians along the street layout.

Requirement: Proportion of block faces that contain a sidewalk as compared to the number of overall block faces in the community

Unit of Assessment: sidewalks

Rating: Represents the extent to which pedestrians are accommodated along streets.

Public Sidewalk Rating			
0	<50%	50% -74%	75% - 100%
0	1	2	3

Policy Relevance: Local pedestrian and cyclist routes on the street are preferred to rear and sideyard pathways as a means to enhance the vitality of the public environment (City of Calgary, 1995b, p. 57).

Outcome #11: Increase accessibility to various recreational opportunities.

Indicator: Access to open space

Sustainability Concept: Access to open space provides recreational and education opportunities to local residents that are important to the health and safety of community residents.

Requirement: 100% of dwelling units must be within 400 m radius of an open space

Unit of Assessment: metres, sub-neighbourhood park, neighbourhood park, community park

Rating: Indicate the accessibility of open space to all residents.

Access to Open Space Rating			
< 75% of units within 400m	75% - < 85% within 400 m	85% - 99% within 400m	100% of units within 400 m
0	1	2	3

Policy Relevance: Sub-neighbourhood, neighbourhood and community parks should be distributed so that all community residents have access to some public activity areas (City of Calgary, 1995b, p. 35).

Indicator: Range of outdoor recreational activities

Sustainability Concept: A range of recreational activities can satisfy a variety of user needs. People at various lifecycle stages should be able to enjoy the local open space amenities, which requires variety in open space design. Providing for a range of uses in open space allows for flexibility in the use of the space over time.

Requirement: Open space must support a minimum of four levels of activities: passive, active, children’s play and ecological area (Burton, Ellis & Homenuck in Skeith, 2002, p. 72)

Unit of Assessment: seating areas, playing fields, tot lot, natural area

Rating: Represents the variety of recreational opportunities provided in open space.

Outdoor Recreational Activity Rating			
1 Type	2 Types	3 Types	4 Types
0	1	2	3

Policy Relevance: Provide a variety of opportunities for people of all ages, interests and abilities in local open space design.

Indicator: Organized community involvement

Sustainability Concept: The building, operations and maintenance costs of various recreational amenities and facilities are too high for the City to manage so such amenities are not provided. Various options for financing the lifecycle costs of community facilities and amenities need to be considered in order to provide and maintain such assets.

Requirement: Existence of homeowner association or other citizen groups involved in the planning process or management of recreational amenities

Unit of Assessment: Homeowner association and any other community citizen groups

Rating: To indicate the involvement of the local community in planning and management of the local recreational amenities.

Community Involvement Rating			
No groups	One group	Two groups	Three or more groups
0	1	2	3

Policy Relevance: Homeowner associations were noted as one potential means to provide opportunities for long-term community financing and involvement in the design, construction, operation, and maintenance of community facilities and open space. The rating considers the involvement of other groups, if any, that facilitate community financing or involvement in open space planning and operations.

Outcome #12: Increase the amount of existing natural systems incorporated into the open space plan.

Indicator: Presence of environmental open space

Sustainability Concept: The natural area incorporated into the community open space plan adds to the physical amenity of the area for community residents and the conservation of natural characteristics of the land. The City preserves ecologically diverse and environmentally significant areas to provide vegetation for micro-climate benefits (e.g. shade, wind protection), and to enhance air, soil and water quality (City of Calgary, 2002, p. 13).

Requirement: Number of types of environmental open space in the community

Unit of Assessment: natural environment areas, wetlands, Environmental Reserve

Rating: To represent the extent of variety in natural area preservation and integration in community design.

Environmental Open Space Rating			
No types	1 type	2 types	3 or more types
0	1	2	3

Policy Relevance: To provide passive recreational areas and educational opportunities while protecting and maintaining natural systems, natural areas should be incorporated into the urban form (City of Calgary, 1995b, p. 33).

Outcome #13: Increase the use of alternative methods to stormwater management.

Indicator: Integrate stormwater facilities into overall open space plan

Sustainability Concept: Maintaining natural drainage systems instead of using artificial stormwater management systems can reduce operating and maintenance costs while controlling water quality and/or flow levels.

Requirement: Presence of engineered or constructed wetland, bioswales, retention ponds, reduction in impervious surfaces (e.g. asphalt, pavement, cement)

Unit of Assessment: engineered or constructed wetland, bioswales, retention ponds, alternative materials that allow water percolation

Rating: Represents the extent of alternative stormwater management practices incorporated in the open space plan.

Alternative Stormwater Management Rating			
None	1 type	2 types	3 or more
0	1	2	3

Policy Relevance: To encourage the integration of stormwater facilities to complement the open space plan while lowering infrastructure and maintenance costs and maintaining water quality and natural areas.

Outcome #14: Reduce the amount of waste entering landfills from the construction process and homeowners in new communities.

Indicator: Construction waste management

Sustainability Concept: To reduce the amount of waste generated and disposed of during building construction, to reduce overall construction costs and in turn reduce municipal costs for landfill sites.

Requirement:

- Use of recycled products in construction
- Reuse of construction materials
- Waste auditing program in place during construction

Unit of Assessment: recycled construction products, reuse of construction materials, waste auditing program

Rating: Signifies the extent of construction waste management in the building process.

Construction Waste Management Rating			
No requirements met	1 requirement met	2 requirements met	3 requirements met
0	1	2	3

Policy Relevance: To deal with waste generation at the source during the construction process.

Indicator: Household and commercial activity waste management

Sustainability Concept: To reduce the amount of recyclable and degradable waste entering the landfills from households, commercial and public service activities in suburbs.

Requirement:

- Community recycling bins located at community core
- Recycling facilities for commercial sites
- Recycling and/or composting facilities for households

Unit of Assessment: community recycling bins, commercial site recycling bins, household composters

Rating: Signifies the extent of household and commercial waste management.

Household & Commercial Activity Waste Management Rating			
No requirements met	1 requirement met	2 requirements met	3 requirements met
0	1	2	3

Policy Relevance: To encourage recycling and composting of waste materials by households, and commercial and public service activities.

Outcome #15: Reduce water consumption.

Indicator: Household water use reduction practices

Sustainability Concept: Households can reduce water consumption to address the impacts on downstream sources and City water infrastructure and treatment.

Requirement:

- Dwelling units connected to water metres
- Dwelling units incorporate water-saving devices
- Ecological landscaping

Unit of Assessment: water metres, water-saving devices, ecological landscaping

Rating: Signifies the recommended water-saving features and techniques that have been incorporated into new homes and sites.

Household Water Consumption Rating			
No requirements met	1 requirement met	2 requirements met	3 requirements met
0	1	2	3

Policy Relevance: To encourage water conservation through construction features in new communities, guidelines for construction practices and landscaping were recommended.

Outcome #16: Reduce non-renewable energy consumption.

Indicator: Renewable energy planning and construction practices

Sustainability Concept: To enhance the use of renewable energy sources through site planning and construction practices.

Requirement:

- Majority (50%) of lots oriented to optimize conditions for passive and active solar strategies
- Majority (50%) of buildings built to energy efficient grade
- Any district-heating or co-generation techniques

Unit of Assessment: lots oriented south-north on east-west street, BuiltGreen or LEED rated buildings, district heating or co-generation facilities

Rating: Signifies the consideration of energy-saving practices in site planning and construction.

Energy Rating			
No requirements	1 requirement	2 requirements	3 requirements

met	met	met	met
0	1	2	3

Policy Relevance: Design the community in a means to use less non-renewable energy. This includes alternative community-based energy sources, maximizing solar exposure for buildings through the alignment of the local road network and therefore building orientation and construction (City of Calgary, 1995b, p. 70). Housing design and construction can reduce the consumption of non-renewable energy, reduce energy costs to the public while reducing green house gas emissions from space heating.

2.2. The Partial Rating and Composite Rating

The partial ratings represent the scale of performance of an outcome. The partial rating is derived from the indicator ratings. Those outcomes related to more than one indicator uses the average indicator rating for the outcome partial rating. The ratings provide signs of gaps in implementation particular to elements of community sustainability as defined in the SSS. The composite ratings for each sustainability theme, derived from the addition of the four outcome partial ratings of the theme, provide a simpler, inclusive evaluation of sustainability performance. Following is the report card framework to illustrate the rating system.

Table 3. - Sample Report Card			Indicator Rating	Partial Rating	Composite Rating
Theme	Outcomes	Indicators			
Efficiency					
#1: Achieve a minimum gross density of 7 upa.	Residential Unit Density	0 - 3	0 - 3	/12	
#2: Increase the accessibility, comfort and safety of public transportation.	Locating transit network and stops in ASP	0 - 3	0 - 3		
	Proportion of dwelling units within 400m of transit network	0 - 3			
	Transit Stop Quality	0 - 3			
#3: Achieve shared use of sites and/or buildings for public facilities and services.	Number of shared use sites and/or buildings	0 - 3	0 - 3		
#4: Increase home occupations.	Number of design elements tailored for home occupations	0 - 3	0 - 3		
Diversity					
#5: Increase accessibility to mixed-use activity centres.	Distance of core from regional shopping centre	0 - 3	0 - 3	/12	
	Ratio of commercial development per resident	0 - 3			
	Centrality of Core	0 - 3			
#6: Achieve a significant mix of uses in the community core and neighbourhood nodes.	Mix of public and private uses	0 - 3	0 - 3		
	Mix of public and private uses	0 - 3			
#7: Increase the variety of housing types in addition to single-family type dwellings.	Proportion of dwelling units that are multi-family units	0 - 3	0 - 3		
	Affordable housing program	0 - 3			
#8: Increase accessibility of multi-family development to activity centres.	Proportion of multi-family units located within 400m of commercial activities	0 - 3	0 - 3		
Accessibility					
#9: Increase accessibility for pedestrians and cyclists within activity centres.	Proportion of parking spaces located to side or rear of the site	0 - 3	0 - 3	/12	
	Proportion of retail access points fronting the street	0 - 3			
#10: Increase the quality of road patterns and streetscape design for pedestrians, cyclists and transit-users.	Incidence of 4-way intersections	0 - 3	0 - 3		
	Community through-street spacing	0 - 3			
	Number of traffic calming features	0 - 3			
	Proportion of residential development with rear lanes	0 - 3			
	Proportion of block faces with sidewalks	0 - 3			
#11: Increase accessibility to various recreational opportunities.	Access to open space	0 - 3	0 - 3		
	Range of outdoor recreational activities	0 - 3			
	Organized community involvement in planning & management	0 - 3			
#12: Increase the amount of existing natural systems incorporated into the open space plan.	Presence of environmental open space	0 - 3	0 - 3		
Environmental Responsibility					
#13: Increase the use of alternative methods to stormwater management.	Alternative stormwater management features integrated in open space plan	0 - 3	0 - 3	/12	
#14: Reduce the amount of waste entering landfills from the construction process and homeowners in new communities.	Construction waste management	0 - 3	0 - 3		
	Household and commercial activity waste management	0 - 3			
#15: Reduce water consumption.	Household water consumption reduction practices	0 - 3	0 - 3		
#16: Reduce non-renewable energy consumption.	Non-renewable energy reduction practices	0 - 3	0 - 3		

3.0 Applying the Evaluation Framework

The evaluation framework is applied to a sample of local case studies. The case studies reflect communities for which the SSS was explicitly considered in the development of the strategic policy plan. Senior planners at the City of Calgary identified McKenzie Towne as encompassing the new urbanism framework upon which *the* SSS was developed. The community has been recognized with a Canadian Institute of Planners Award of Excellence and by the Urban Land Institute for its unique form of suburban development.

Senior planners noted that the policy plan for the communities of Evergreen and Bridlewood was extensively influenced by *the* SSS. The integration of *the* SSS policies in the Area Structure Plan (ASP) for Evergreen and Bridlewood was imperative at the time of policy development as the first ASP developed for a residential community after adoption of the SSS. The ASP, the *Midnapore III Community Plan*, indicates that the plan strives to meet the goals and objectives of the CTP and *the* SSS (City of Calgary, 1997b, p.2).

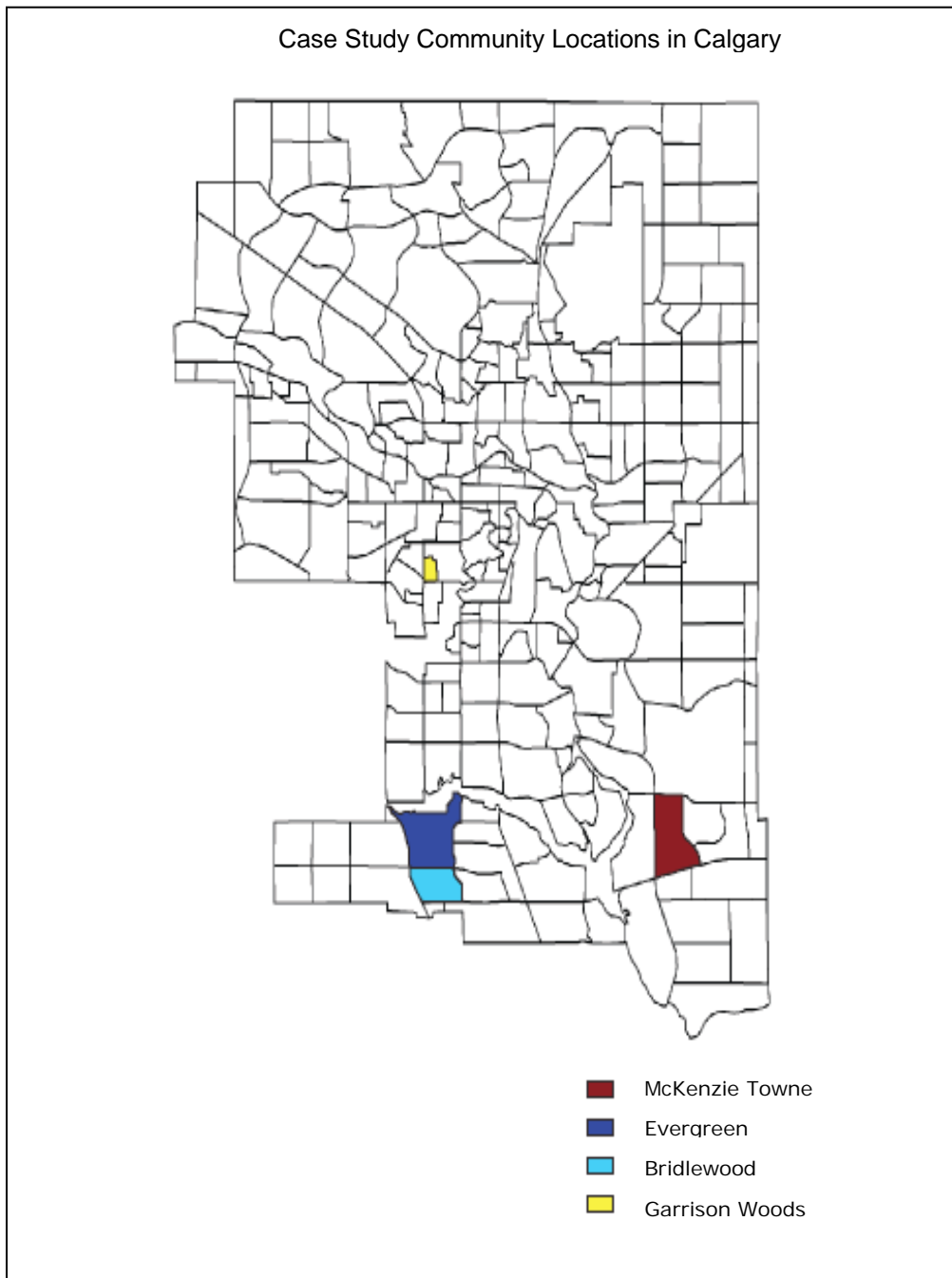
Garrison Woods is an infill community of significant area (70 hectares) located in the established community of Altadore in the City of Calgary. Though the neighbourhood is not a greenfield development it is included in the case study evaluation because it was identified as a best practice in sustainable neighbourhood design and development in Calgary by senior planners and the greater planning community. The neighbourhood of Garrison Woods has received recognition through various awards including, the Award for Excellence for Environmental Design in 1999 from the Alberta Association of the Canadian Institute of Planners and the Best Practice and Comprehensive Planning Award in 2000 from the Real Property Institute of Canada.

A Community Plan (CP) was developed for Garrison Woods. According to the City of Calgary, a CP performs the same functions of an ASP but is not provided statutory status by the MGA (Federation of Calgary Communities & City of Calgary, 2002). The CP is recognized as a formal plan providing the policy framework for the future development of the area. The *CFB East Community Plan* explicitly noted the influence of *the* SSS goals. It defines a successful community to be one that meets a number of goals that benefit the public at large, specifying policies outlined in various City of Calgary policies, including those of *the* SSS (City of Calgary, 1998b, p. 19).

Table 4 – Case Study Communities

Community	Area (ha)	ASP Year	Start Year	Status	Sector
McKenzie Towne	389	1995	1997	Developing	SE
Evergreen	407	1997	1998	Developing	S
Bridlewood	247	1997	1998	Developing	S
Garrison Woods	71	1998	1998	Built-out	SW

Figure 3 Sample Community Map



3.1. Application of the Evaluation Framework to Sample Communities

The sustainability evaluation framework is applied to each community of the sample. The evaluation results are presented in the report cards with the indicator, partial and composite ratings of each community. The indicator ratings related to each outcome are averaged to derive the partial rating for the outcome from zero to three. The composite rating is the total of the partial ratings by sustainability theme. The composite rating ranges from zero to twelve. Adding the four sustainability theme composite ratings represents the overall performance.

Table 5. McKenzie Towne Report Card			Indicator Rating	Partial Rating	Composite Rating
Theme	Outcomes	Indicators			
Efficiency					
#1: Achieve a minimum gross density of 7 upa.	Residential Unit Density	2	2	4	
#2: Increase the accessibility, comfort and safety of public transportation.	Locating transit network and stops in ASP	1	2		
	Proportion of dwelling units within 400m of transit network	3			
	Transit Stop Quality	1			
#3: Achieve shared use of sites and/or buildings for public facilities and services.	Number of shared use sites and/or buildings	0	0		
#4: Increase home occupations.	Number of design elements tailored for home occupations	0	0		
Diversity					
#5: Increase accessibility to mixed-use activity centres.	Distance of core from regional shopping centre	1	2		
	Ratio of commercial development per resident	2			
	Centrality of Core	3			
#6: Achieve a significant mix of uses in the community core and neighbourhood nodes.	Mix of public and private uses	3	2		
	Mix of public and private uses	1			
#7: Increase the variety of housing types in addition to single-family type dwellings.	Proportion of dwelling units that are multi-family units	1	2		
	Affordable housing program	2			
#8: Increase accessibility of multi-family development to activity centres.	Proportion of multi-family units located within 400m of commercial activities	2	2		
Accessibility					
#9: Increase accessibility for pedestrians and cyclists within activity centres.	Proportion of parking spaces located to side or rear of the site	2	3		
	Proportion of retail access points fronting the street	3			
#10: Increase the quality of road patterns and streetscape design for pedestrians, cyclists and transit-users.	Incidence of 4-way intersections	0	1		
	Community through-street spacing	0			
	Number of traffic calming features	1			
	Proportion of residential development with rear lanes	3			
	Proportion of block faces with sidewalks	3			
#11: Increase accessibility to various recreational opportunities.	Access to open space	3	2		
	Range of outdoor recreational activities	1			
	Organized community involvement in planning & management	1			
#12: Increase the amount of existing natural systems incorporated into the open space plan.	Presence of environmental open space	1	1		
Environmental Responsibility					
#13: Increase the use of alternative methods to stormwater management.	Alternative stormwater management features integrated in open space plan	2	2		
#14: Reduce the amount of waste entering landfills from the construction process and homeowners in new communities.	Construction waste management	0	1		
	Household and commercial activity waste management	1			
#15: Reduce water consumption.	Household water consumption reduction practices	2	2		
#16: Reduce non-renewable energy consumption.	Non-renewable energy reduction practices	0	0		

Table 6. Evergreen Report Card			Indicator Rating	Partial Rating	Composite Rating
Theme	Outcomes	Indicators			
Efficiency					
#1:	Achieve a minimum gross density of 7 upa.	Residential Unit Density	1	1	2
#2:	Increase the accessibility, comfort and safety of public transportation.	Locating transit network and stops in ASP	0	1	
		Proportion of dwelling units within 400m of transit network	3		
		Transit Stop Quality	1		
#3:	Achieve shared use of sites and/or buildings for public facilities and services.	Number of shared use sites and/or buildings	0	0	
#4:	Increase home occupations.	Number of design elements tailored for home occupations	0	0	
Diversity					
#5:	Increase accessibility to mixed-use activity centres.	Distance of core from regional shopping centre	1	1	6
		Ratio of commercial development per resident	1		
		Centrality of Core	1		
#6:	Achieve a significant mix of uses in the community core and neighbourhood nodes.	Mix of public and private uses	2	2	
		Mix of public and private uses	1		
#7:	Increase the variety of housing types in addition to single-family type dwellings.	Proportion of dwelling units that are multi-family units	1	1	
		Affordable housing program	1		
#8:	Increase accessibility of multi-family development to activity centres.	Proportion of multi-family units located within 400m of commercial activities	2	2	
Accessibility					
#9:	Increase accessibility for pedestrians and cyclists within activity centres.	Proportion of parking spaces located to side or rear of the site	0	0	4
		Proportion of retail access points fronting the street	0		
#10:	Increase the quality of road patterns and streetscape design for pedestrians, cyclists and transit-users.	Incidence of 4-way intersections	0	1	
		Community through-street spacing	1		
		Number of traffic calming features	1		
		Proportion of residential development with rear lanes	1		
		Proportion of block faces with sidewalks	2		
#11:	Increase accessibility to various recreational opportunities.	Access to open space	3	2	
		Range of outdoor recreational activities	1		
		Organized community involvement in planning & management	1		
#12:	Increase the amount of existing natural systems incorporated into the open space plan.	Presence of environmental open space	1	1	
Environmental Responsibility					
#13:	Increase the use of alternative methods to stormwater management.	Alternative stormwater management features integrated in open space plan	2	2	4
#14:	Reduce the amount of waste entering landfills from the construction process and homeowners in new communities.	Construction waste management	0	0	
		Household and commercial activity waste management	0		
#15:	Reduce water consumption.	Household water consumption reduction practices	2	2	
#16:	Reduce non-renewable energy consumption.	Non-renewable energy reduction practices	0	0	

Table 7. Bridlewood Report Card			Indicator Rating	Partial Rating	Composite Rating
Theme	Outcomes	Indicators			
Efficiency					
#1: Achieve a minimum gross density of 7 upa.	Residential Unit Density	2	2	4	
#2: Increase the accessibility, comfort and safety of public transportation.	Locating transit network and stops in ASP	1	2		
	Proportion of dwelling units within 400m of transit network	3			
	Transit Stop Quality	1			
#3: Achieve shared use of sites and/or buildings for public facilities and services.	Number of shared use sites and/or buildings	0	0		
#4: Increase home occupations.	Number of design elements tailored for home occupations	0	0		
Diversity					
#5: Increase accessibility to mixed-use activity centres.	Distance of core from regional shopping centre	1	2	7	
	Ratio of commercial development per resident	2			
	Centrality of Core	2			
#6: Achieve a significant mix of uses in the community core and neighbourhood nodes.	Mix of public and private uses	3	2		
	Mix of public and private uses	1			
#7: Increase the variety of housing types in addition to single-family type dwellings.	Proportion of dwelling units that are multi-family units	1	1		
	Affordable housing program	1			
#8: Increase accessibility of multi-family development to activity centres.	Proportion of multi-family units located within 400m of commercial activities	2	2		
Accessibility					
#9: Increase accessibility for pedestrians and cyclists within activity centres.	Proportion of parking spaces located to side or rear of the site	0	0	4	
	Proportion of retail access points fronting the street	0			
#10: Increase the quality of road patterns and streetscape design for pedestrians, cyclists and transit-users.	Incidence of 4-way intersections	0	1		
	Community through-street spacing	1			
	Number of traffic calming features	1			
	Proportion of residential development with rear lanes	1			
	Proportion of block faces with sidewalks	1			
#11: Increase accessibility to various recreational opportunities.	Access to open space	3	2		
	Range of outdoor recreational activities	1			
	Organized community involvement in planning & management	1			
#12: Increase the amount of existing natural systems incorporated into the open space plan.	Presence of environmental open space	2	1		
Environmental Responsibility					
#13: Increase the use of alternative methods to stormwater management.	Alternative stormwater management features integrated in open space plan	1	1	4	
#14: Reduce the amount of waste entering landfills from the construction process and homeowners in new communities.	Construction waste management	0	1		
	Household and commercial activity waste management	1			
#15: Reduce water consumption.	Household water consumption reduction practices	2	2		
#16: Reduce non-renewable energy consumption.	Non-renewable energy reduction practices	0	0		

Table 8. Garrison Woods Report Card			Indicator Rating	Partial Rating	Composite Rating
Theme	Outcomes	Indicators			
Efficiency					
#1: Achieve a minimum gross density of 7 upa.	Residential Unit Density	3	3	6	
#2: Increase the accessibility, comfort and safety of public transportation.	Locating transit network and stops in ASP	2	3		
	Proportion of dwelling units within 400m of transit network	3			
	Transit Stop Quality	N/A			
#3: Achieve shared use of sites and/or buildings for public facilities and services.	Number of shared use sites and/or buildings	0	0		
#4: Increase home occupations.	Number of design elements tailored for home occupations	0	0		
Diversity					
#5: Increase accessibility to mixed-use activity centres.	Distance of core from regional shopping centre	3	2	9	
	Ratio of commercial development per resident	2			
	Centrality of Core	2			
#6: Achieve a significant mix of uses in the community core and neighbourhood nodes.	Mix of public and private uses	3	3		
	Mix of public and private uses	N/A			
#7: Increase the variety of housing types in addition to single-family type dwellings.	Proportion of dwelling units that are multi-family units	3	2		
	Affordable housing program	1			
#8: Increase accessibility of multi-family development to activity centres.	Proportion of multi-family units located within 400m of commercial activities	2	2		
Accessibility					
#9: Increase accessibility for pedestrians and cyclists within activity centres.	Proportion of parking spaces located to side or rear of the site	3	3	6	
	Proportion of retail access points fronting the street	3			
#10: Increase the quality of road patterns and streetscape design for pedestrians, cyclists and transit-users.	Incidence of 4-way intersections	0	2		
	Community through-street spacing	2			
	Number of traffic calming features	1			
	Proportion of residential development with rear lanes	3			
	Proportion of block faces with sidewalks	2			
#11: Increase accessibility to various recreational opportunities.	Access to open space	3	2		
	Range of outdoor recreational activities	1			
	Organized community involvement in planning & management	1			
#12: Increase the amount of existing natural systems incorporated into the open space plan.	Presence of environmental open space	0	0		
Environmental Responsibility					
#13: Increase the use of alternative methods to stormwater management.	Alternative stormwater management features integrated in open space plan	0	0	3	
#14: Reduce the amount of waste entering landfills from the construction process and homeowners in new communities.	Construction waste management	1	1		
	Household and commercial activity waste management	0			
#15: Reduce water consumption.	Household water consumption reduction practices	2	2		
#16: Reduce non-renewable energy consumption.	Non-renewable energy reduction practices	0	0		

3.2. Conclusion

The research suggests that the implementation of SSS policy directed the development of community cores and the concept of a nodal organizational structure in new communities. Unit densities and housing type mix reached the minimum targets set out in the SSS. The efficiencies in local and citywide transportation infrastructure intended were not achieved as the employment opportunities, extent of commercial, social and cultural activities, and location and form of density do not support extensive modal shift from the private automobile to walking, cycling or transit use.

Action on the environmentally responsible policies of the SSS was extremely limited. Resource-related benefits in the planning and construction of new communities were highly limited as integrated design policy promoting waste, water and energy management in ASPs was absent. Stormwater management through the integration of wetlands is an achievement in new communities however more comprehensive stormwater management practices have not yet been developed.

Overall, elements of SSS policy have filtered into new community design and development but not at the comprehensive level at which considerable transportation and land use efficiencies would be recognized (Refer to Appendix C for implementation findings by SSS policy). It has taken a decade and a major shift in Calgary's housing market to implement, and even surpass, some of the policy aims in *the SSS*. *The SSS* appears to be the first attempt for the City of Calgary to marry land use and transportation planning, setting a direction for new community design and development that has, though slowly and intermittently, been coming to fruition over the time since adoption of *the SSS*.

The results of the research need to be interpreted in the context of its limitations.

First, the extent of literature available on the use of indicators at the spatial level of the community or neighbourhood is limited. The majority of literature on the development and use of sustainability indicators is geared to the city or national scale. The indicators utilized in the evaluation are referenced from a limited number of community plan evaluations found in the literature review. Second, data set accessibility is a considerable constraint in the development and application of an indicator-based evaluation framework. The indicator selection was constrained by the accessibility to available data. The sample communities include only those for which research was compiled for the City of Calgary in the summer of 2007, rather than completing a comprehensive review including all communities planned and developed since 1995. This is mainly due to data accessibility, and then time and resource constraints.

Third, the composite ranking system is utilized as a means to simplify the comprehensive study of an array of elements that affect sustainability. This provides a rapid assessment of a complex subject. Wong notes that, "rankings on their own without further elaboration or explanation will not improve our knowledge of the issues concerned and at time may send out the very negative signal of being merely a numbering exercise" (2006, p. 84). Such a framework can conceal detailed information on different elements of sustainability, presenting the potential for misinterpretation by a too literal dependence on the final rating. However rigorous analysis and interpretation of the ratings provides the added value by converting the evaluation information into knowledge of the subject under study (Wong, 2006, p. 81).

It is recognized that in assigning ratings and in the production of composite scores there is a certain amount of subjective judgment and weightings from the analyst (Wong, 2006, p. 85). Clarity of the dimension of the element that is being ranked and the links with the policy objectives provide the relevance of the indicators and associated ratings.

Lastly, the evaluation is focused on presenting the compliance with SSS land use planning policy in the built form and land uses of communities planned and developed since 1995. Due to the long-term timeframe of ASPs and the pace of actual development none of the communities to which the evaluation framework is applied is completely built-out (with the exception of Garrison Woods). Therefore indicators are based on the actual built form and the anticipated development types and forms derived from the approved Tentative Plans. Any community areas not incorporated in a Tentative Plan are not included in the indicator calculations.

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Appendix A

Sustainable Suburbs Study Policies

Community Centres and Neighbourhood Nodes

C.1 Mixed use public activity centres must be located in all communities in the form of a community centre and a number of neighbourhood nodes.

C.2 The community centre and neighbourhood nodes must be located strategically and should be as central as possible, while recognizing topographical constraints.

C.3 A mix of both public and private activities must be located in and around the community centre and neighbourhood nodes.

C.4 Community centre and neighbourhood node site designs must encourage pedestrian and bicycle access and transit use.

C.5 Compatible home occupations should be encouraged.

C.6 Community centre and neighbourhood node sites may be developed with interim uses, provided that the eventual development of the preferred mix of uses is not precluded.

Schools and Open Space

OS.1 Existing natural systems (including significant environmentally sensitive areas) must be integrated into new communities and will form part of a comprehensive and contiguous regional open space system.

OS.2 Built open space (including joint use sites) must be located, sized and configured to create places that are functional, safe, flexible and form a linked open space systems.

OS.3 Local open space must provide a variety of opportunities for people of all ages, interests and abilities.

OS.4. Joint use sites should be located in proximity to the community centre or neighbourhood nodes, on the transit route and close to daycare and other services.

OS.5 The community centre must accommodate a community hall or similar facilities and contain functional public open space.

OS.6 Opportunities for long-term community financing and involvement in the design, construction, operation and maintenance of community facilities or local open space should be pursued.

OS.7 Opportunities for shared use of sites and/or buildings for public facilities (e.g., fire, emergency services, library, police, schools, community facilities, social services, health services, etc.) should be pursued.

Housing

H.1 All communities must achieve a minimum density of 7 units per gross acre (17.3 units per gross hectare).

H.2 All communities must provide a wide choice of housing types in addition to single family.

H.3 Policies and guidelines ensuring that an adequate choice of low to medium income housing is provided in suburban communities shall be developed as part of a new comprehensive city-wide package of policies on affordable housing.

H.4 Most multi-family housing should be located near community centres, neighbourhood nodes, recreational areas or other public amenities, and be close to transit stops.

Transportation

T.1 The street system in a community must provide all residents with direct links between key community focal points (community centre, neighbourhood nodes, schools, open spaces, major entrances).

T.2 The transit system must be integrated into the community design and be a key component of the community centre, neighbourhood nodes and other community focal points.

T.3 A new package of street design standards must be developed to meet the needs of pedestrians, cyclists and transit-users, while continuing to provide for vehicle transportation.

Environmental Issues

E.1 Builders are encouraged to ensure that all new buildings in new communities are audited for construction waste.

E.2 Builders are encouraged to use recycled materials in the construction of new buildings when supplies are available, existing standards allow, and the cost of materials is feasible.

E.3 Provision for a recycling depot must be included in the design of the community centre.

E.4 Builders are encouraged to equip all buildings in new communities with bins for sorting recyclable dry waste and to locate a permanent composter on site for degradable wet waste and yard waste.

E.5 As part of the future Integrated Solid Waste Management Plan, the feasibility of waste limits and/or yard waste bans will be determined.

E.6 All homes in new communities should have water meters and manufactured water-saving fixtures.

E.7 Alternative methods to traditional stormwater management techniques must be examined, in terms of appropriateness and cost, for use in new communities.

E.8 Builders are encouraged to design, locate and construct all buildings in new communities with the objective of reducing energy consumption.

Appendix B
Sustainable Suburbs Study Policies & Related Performance Criteria

SSS Policy	SSS Performance Criteria
<p>C.1 Mixed use public activity centres must be located in all communities in the form of a community centre and a number of neighbourhood nodes.</p>	<ul style="list-style-type: none"> - Determine the locations of the community centre and neighbourhood nodes in the early stages of the planning process. - Provide a significant mix of public and commercial activities in the community centre to satisfy many of the daily and weekly needs of residents. These include activities and uses such as shopping, public facilities and open space. The community centre should also serve as the main transit 'hub' of the community. - At neighbourhood nodes, provide a smaller mix of activities, uses and a transit stop. - As part of each Growth Area Management Plan, determine the locations of sector and regional shopping facilities so as to not undermine the viability of community retail.
<p>C.2 The community centre and neighbourhood nodes must be located strategically and should be as central as possible, while recognizing topographical constraints.</p>	<ul style="list-style-type: none"> - Locate the community centre within a comfortable 5 minute (400 m) walk for as many people as possible. - Locate the neighbourhood node within a 5 minute direct walk from the furthest house in the neighbourhood it serves.
<p>C.3 A mix of both public and private activities must be located in and around the community centre and neighbourhood nodes.</p>	<ul style="list-style-type: none"> - Incorporate a food store site into the community centre to allow a 2,800 sq m development. - Integrate transit stops with the community centre and neighbourhood nodes.
<p>C.4 Community centre and neighbourhood node site designs must encourage pedestrian and bicycle access and transit use.</p>	<ul style="list-style-type: none"> - Reduce parking requirements for community centre commercial from 5.5 stalls per 93 sq. m. to a range of 4 to 4.5 stalls. - Locate at least one retail access point, combined with shelter and complementary uses, so as to front onto the street adjacent to a transit stop. - In a shopping centre or main street configuration, locate parking primarily to the site and rear of the site. - In the community centre and neighbourhood nodes, front a substantial proportion of commercial onto the street, with minimal setbacks.
<p>C.5 Compatible home occupations should be encouraged.</p>	<ul style="list-style-type: none"> - Encourage home occupations.
<p>C.6 Community centre and neighbourhood node sites may be developed with interim uses, provided that the eventual development of the preferred mix of uses is not precluded.</p>	<ul style="list-style-type: none"> - Determine that any interim use would not preclude the intended long-term commercial and related uses. - Integrate a transit stop with any interim use. - In any proposal, include a concept plan describing any interim uses and their life expectancy.
<p>OS.1 Existing natural systems (including significant environmentally sensitive areas) must be integrated into new communities and will form part of a comprehensive and contiguous regional open space system.</p>	<ul style="list-style-type: none"> - Include, as part of Growth Area Management Plans, a general open space plan which identifies natural systems that should be protected, connections to the contiguous regional open space system, the local community open space system, and the regional pathway system. - Identify proposed transportation and utility facilities that may impact natural systems. - Include, in a Community Plans, a detailed open space plan containing a linked hierarchy of open spaces.
<p>OS. 2 Built open space (including joint use sites) must be located, sized and configured to create places that are functional, safe, flexible and form a linked open space systems.</p>	<ul style="list-style-type: none"> - Establish and maintain a linked local system of functional open space for educational and recreational purposes. - Provide an open space system which is accessible and designed for safe use. - Consider pedestrian and cyclist routes as fundamental

	<p>elements in planning the linked local open space system as well as providing connections to the regional pathway and open space systems.</p> <ul style="list-style-type: none"> - Connect natural areas to the regional and local open space systems wherever possible. - Provide for a broad range of open space recreational activities.
OS.3 Local open space must provide a variety of opportunities for people of all ages, interests and abilities.	<ul style="list-style-type: none"> - Consider the long-term needs of the community in planning the local community open space system. - Design parks to promote accessibility.
OS 4. Joint use sites should be located in proximity to the community centre or neighbourhood nodes, on the transit route and close to daycare and other services.	<ul style="list-style-type: none"> - Locate, size and configure joint use sites to encourage use and ensure they are not perceived as a barrier to walking. - Consider opportunities for shared use of sites and/or buildings with other public agencies.
OS.5 The community centre must accommodate a community hall or similar facilities and contain functional public open space.	<ul style="list-style-type: none"> - Provide functional public open space and a site for a community facility in the community centre.
OS.6 Opportunities for long-term community financing and involvement in the design, construction, operation and maintenance of community facilities or local open space should be pursued.	<ul style="list-style-type: none"> - Address how community facilities, open space features or amenities will be financed and/or managed. - Provide for the potential inclusion of all homeowners in the community in any body (e.g. a homeowners' association) established to pursue community-based financing and/or management of community facilities or local open space.
OS.7 Opportunities for shared use of sites and/or buildings for public facilities (e.g., fire, emergency services, library, police, schools, community facilities, social services, health services, etc.) should be pursued.	<ul style="list-style-type: none"> - Address opportunities for shared use of sites and/or buildings for these public facilities.
H.1 All communities must achieve a minimum density of 7 units per gross acre (17.3 units per gross hectare).	<ul style="list-style-type: none"> - Achieve a minimum average density of 17.3 units per gross ha (7 upa) across the community. - Provide a graduated density pattern that is highest near the community centre, neighbourhood nodes and transit stops.
H.2 All communities must provide a wide choice of housing types in addition to single family.	<ul style="list-style-type: none"> - Ensure that approximately 20% of all dwelling units in a community are other than single family. - Limit the percentage of multi-family units in a neighbourhood to a maximum of approximately 60 percent. - Ensure that architectural styles and finishes of residential buildings on a street are compatible with those nearby and building orientation is predominantly toward the street.
H.3 Policies and guidelines ensuring that an adequate choice of low to medium income housing is provided in suburban communities shall be developed as part of a new comprehensive city-wide package of policies on affordable housing.	<ul style="list-style-type: none"> - Developers are encouraged to target a minimum of approximately 10 percent of all dwelling units. - A study be undertaken relating to the provision of affordable housing.
H.4 Most multi-family housing should be located near community centres, neighbourhood nodes, recreational areas or other public amenities, and be close to transit stops.	<ul style="list-style-type: none"> - Locate most multi-family housing within 400 m of the community centre, neighbourhood nodes and transit stops. - Determine the location of most multi-family sites during the preparation of the plan.
T.1 The street system in a community must provide all residents with direct links between key community focal points (community centre, neighbourhood nodes, schools, open spaces, major entrances).	<ul style="list-style-type: none"> - Provide a street system which offers a number of routes to major destinations within the community. - Provide connections to the surrounding regional road network at several community entrances to avoid concentrating vehicle traffic at one location.

	<ul style="list-style-type: none"> - Provide direct pedestrian and cyclist-oriented routes. - Include a street pattern which supports efficient routes for transit service within the community and which connects with the regional transit system. - Provide bicycle routes (separate pathways or on-street) to link community focal points with the regional pathway system. - Design streets to safely incorporate cycling. - Ensure the internet community street pattern does not divide a neighbourhood or form barriers between residential areas and the community centre, neighbourhood nodes or schools.
T.2 The transit system must be integrated into the community design and be a key component of the community centre, neighbourhood nodes and other community focal points.	<ul style="list-style-type: none"> - Incorporate regional transit facilities into the community centre. - Ensure that transit routes within the community are as direct as possible, to shorten trip length. - Design the community centre and neighbourhood nodes to be pedestrian and transit-oriented. - Indicate the transit network and transit stop locations on the community plan. - Strive to limit the street-based walking distance from dwelling units to a transit stop to 400 m. Ensure 85 percent of dwelling units are within walking distance to a transit stop.
T.3 A new package of street design standards must be developed to meet the needs of pedestrians, cyclists and transit-users, while continuing to provide for vehicle transportation.	<ul style="list-style-type: none"> - Develop a new selection of pedestrian, cyclist and transit-friendly street designs.
E.1 Builders are encouraged to ensure that all new buildings in new communities are audited for construction waste.	<ul style="list-style-type: none"> - Builders are encouraged to: - Equip all construction sites with a waste bin partitioned for the sorting of debris. - Collect, sort and transport all recyclable waste to identified recycling facilities. - Provide a temporary facility for storing reusable construction materials during the building phase, to facilitate the exchange of materials otherwise wasted.
E.2 Builders are encouraged to use recycled materials in the construction of new buildings when supplies are available, existing standards allow, and the cost of materials is feasible.	<ul style="list-style-type: none"> - Use recycled products in building construction where availability and suitability allow. - Endeavour to inform the homebuyer of those recycled products that are considered to be a feasible alternative to traditional materials and fixtures.
E.3 Provision for a recycling depot must be included in the design of the community centre.	<ul style="list-style-type: none"> - Locate recycling depots close to other services within the community centre. - Provide good vehicular and pedestrian access to recycling depots. - Provide for an information exchange/dissemination function at recycling depots.
E.4 Builders are encouraged to equip all buildings in new communities with bins for sorting recyclable dry waste and to locate a permanent composter on site for degradable wet waste and yard waste.	<ul style="list-style-type: none"> - Install built-in sorting bins at convenient locations in new single and two-family homes and in common areas in multi-family housing developments, commercial and institutional buildings, where appropriate. - Install permanent composters on all new residential lots and on commercial and institutional sites. - Ensure that clear directions on the use and maintenance of composters are provided with the unit.
E.5 As part of the future Integrated Solid Waste Management Plan, the feasibility of waste limits and/or yard waste bans will be determined.	<ul style="list-style-type: none"> - Provide containers of a prescribed standard dimension for each single-family residence. - Establish an enforcement program and penalty system.
E.6 All homes in new communities should have water meters and manufactured water-saving fixtures.	<ul style="list-style-type: none"> - Builders are encouraged to: - Equip all show homes in new communities with water meters. - Equip all buildings with manufactured low volume toilets. - Equip all buildings with manufactured water-saving fixtures such as showerheads and faucets, where

	<p>appropriate.</p> <ul style="list-style-type: none"> - Inform the homebuyers of the water meter incentive program and product information relating to water-saving fixtures.
<p>E.7 Alternative methods to traditional stormwater management techniques must be examined, in terms of appropriateness and cost, for use in new communities.</p>	<p>Integrate stormwater facilities into the overall open space plan for new communities. Identify the use of natural systems for stormwater management. Consider the feasibility of using alternative methods of stormwater management. Assess the potential long-term impact of alternative methods of stormwater management on groundwater quality and availability, and develop monitoring programs.</p>
<p>E.8 Builders are encouraged to design, locate and construct all buildings in new communities with the objective of reducing energy consumption.</p>	<p>Attempt to maximize solar exposure for buildings through the alignment of the local road network. Design and locate houses to maximize solar orientation as well as complementing the streetscape. Use ecological landscaping or xeriscape to supplement heating and cooling systems. Incorporate energy-saving techniques in housing design. Make provision for co-generation or district heating options in the design of the community centre and neighbourhood nodes.</p>

Appendix C

Sustainable Suburbs Study Implementation Findings by Policy

Community Cores and Neighbourhood Nodes: Meeting People's Needs Locally

Key Policy Summary

Community cores and neighbourhood nodes were indicated as important structural elements to community and neighbourhood activities. The locations and composition are an important foundation of a community less dependent on automobile trips to locations outside of the community. The policies are concerned with the intensity of public and private uses in the activity centres and to ensure that design is pedestrian and transit-oriented. The *SSS* states that, "The key to community centre viability is a range and mix of uses to attract residents to the site for a variety of purposes" (City of Calgary, 1995b, p. 25). The policies strive to meet people's needs locally in mixed use community cores and neighbourhood nodes and to have suburban communities function as more than a housing base.

Key Findings by Policy

C.1 Mixed use public activity centres must be located in all communities in the form of a community centre and a number of neighbourhood nodes.

The Acceptable Performance criteria of *the Sustainable Suburbs Study* aimed to affect land use planning policy and process by incorporating a nodal neighbourhood form based on the community core and neighbourhood nodes early in the planning process. Since adoption of *the SSS*, Area Structure Plans incorporate policy about cores and nodes as well as locate core and nodes at the ASP stage. The planning of sector and regional shopping centres takes place as part of the Regional Policy Plan process. However the locations of these regional shopping centres do not provide an adequate distance from community cores as specified in *the SSS* (3.2 km distance criteria specified in *SSS*) as a means to support community core development and the success of the uses in the core by limiting the draw away from community facilities to the regional retail and service districts.

ASP policy for community cores identifies cores as the location for commercial sites. Residential and public uses are allowed in the core areas according to policy however not required. The community cores have developed on large commercial sites. Large parcels and use areas result in a horizontal mix of public and commercial activities, segregated by large parking areas and roadways. The community cores have not developed as transit hubs but rather incorporate typical bus stops, comprising of benches or basic shelter structures at the edges of the commercial developments, along collector roads.

ASP policy has developed to include neighbourhood nodes as an important aspect of the structure of new communities. The *Sustainable Suburbs Study* intended for these nodes to be activity centers that would also serve as transit hubs. Over the time since adoption of the *SSS* node policy has developed to require multi-family or two-family housing, a park and a transit stop; commercial and public uses are identified in policy to be desired uses but indicated as not required. The intent of highly integrated transit stops within the neighbourhood node is not translated into the ASP

policy, or actual development. The intensity of use at neighbourhood nodes is limited since nodes are developed as multi-family sites and/or park space.

C.2 The community centre and neighbourhood nodes must be located strategically and should be as central as possible, while recognizing topographical constraints.

ASP policy did not include the quantitative measures provided in *the SSS* such as; locate the community centre within a comfortable 5 minute (400m) walk for as many people as possible or locate the neighbourhood node within a 5 minute direct walk from the furthest house in the neighbourhood it serves (City of Calgary, 1995b, p. 23). In the case study communities, an average of 60% of the population is within walking distance of the commercial amenities concentrated in the community core. A greater proportion of the populations are within a 5 minute walk (400 m) of the neighbourhood nodes. But the uses developed in the node locations are limited to residential and open spaces, not providing neighbourhood services for the local residents beyond recreation.

Also, the *Transit-Oriented Development Guidelines* is affecting recent ASPs. In recent plans there has been consolidation of the LRT transit planning areas with the community centre (e.g. Auburn Bay, Mahogany). As LRT stations are planned along arterial roadways this trend shifts the community core to the boundary of the community rather than being geographically central within the community. LRT station areas do not provide for a central, high-intensity transit-oriented development in new communities as new community boundaries and therefore planning areas are based upon the borders created by arterial roadways.

C.3 A mix of both public and private activities must be located in and around the community centre and neighbourhood nodes.

Land use mix is horizontal rather than incorporating mixed uses on sites. Large commercial sites are surrounded by residential development. Community cores have incorporated food stores and some basic retail and personal services. Case study community core sites are developed at low intensity (0.5 FAR). Cores have been planned and designated as single, large format commercial sites and developments with low intensity development and maximum parking space.

Transit service is available around the community cores however transit stops are not integrated into the cores or nodes as intended. Transit stops are located on the roadways surrounding the development sites. Actual new community structure, land use and forms are not transit-oriented and therefore cores and nodes do not function as transit hubs.

C.4 Community centre and neighbourhood node site designs must encourage pedestrian and bicycle access and transit use.

Overall design of the community cores does not meet the SSS criteria. Land use designation provides for low floor area ratios and limited integration with surrounding sites. McKenzie Towne is a unique example of community core development with the high street, pedestrian-oriented design concept. The core area land in McKenzie Towne is designated Direct Control District to ensure for a comprehensively designed development including street-oriented commercial developments, unique parking

standards, and multi-residential development. The large-scale commercial developments in most community cores presently require significant road standards as they continue to be auto-oriented parcel sizes, use areas and service formats. The orientation of parking areas has changed from the street to be located in the centre of the large commercially designated land parcels.

Commercial buildings are oriented along the edges of the site parcels but do not front the sidewalks. Building entrances are located towards the parking in the site interiors. Also, drive-throughs are accommodated along the sidewalk sides of the commercial buildings in some developments. Only Garrison Woods has incorporated a commercial/ residential mixed-use development that is significantly street-oriented with minimal front setbacks, sidewalk access, and small-scale retail and service uses at street level.

C.5 Compatible home occupations should be encouraged.

The SSS called for follow-up work related to home occupations with the intent of introducing policies that would better facilitate this form of employment. This follow-up work was not completed and no policy tools have been developed to encourage home occupations. No case study communities incorporated changes to built-form to support home occupations in the parking standards or built structures of new communities.

C.6 Community centre and neighbourhood node sites may be developed with interim uses, provided that the eventual development of the preferred mix of uses is not precluded.

The coordination and implementation of interim uses was not pursued since the time of the SSS. The only interim uses in new communities are sales centres for residential developers which do not serve existing local residents' daily needs.

Findings Summary

Land use policy plans have altered the structure of new suburban communities by outlining community cores and neighbourhood nodes in the policy plans. The extent of the mix of uses provided in the cores and nodes and the intensity of use is limited in these areas by minimal variance in land use designations over large parcels. Retail and services are provided within new communities. The extent of the transit and pedestrian orientation of these developments is limited as transportation and land use design emphasizes automobile use through the number and scale of roads surrounding cores and nodes, as well as the size, designation and design of the parcels at core and node locations.

Schools and Open Space: A Systems Approach

Key Policy Summary

The policy encouraged the integration of parks, pathways and environmentally significant areas into community design and the regional open space system in order to provide environmental, recreational, social and transportation benefits. Community open space should provide a variety of recreational and educational opportunities.

Key Findings by Policy

OS.1 Existing natural systems (including significant environmentally sensitive areas) must be integrated into new communities and will form part of a comprehensive and contiguous regional open space system.

The SSS wanted to affect the planning process in order to incorporate environmentally significant areas in the early planning stages. Existing natural areas and environmentally significant areas are identified at the RPP stage and then further analyzed at the ASP and Outline Plans. RPP's include identification of potential conservation and environmentally significant areas. The extent of natural area that is preserved is determined according to provincial regulations. The City administration does not have means to require more natural area incorporation beyond the provincial regulations.

OS.2 Built open space (including joint use sites) must be located, sized and configured to create places that are functional, safe, flexible and form a linked open space system.

The SSS and ASPs promote connected, accessible open space systems. Linear connections are common in new communities to provide for direct pedestrian and cyclist routes. The pathways are fundamental to the linked local open space system. Connections to the regional pathway exist and are identified at ASP stage. As activity centres are minimal in new communities, the linked open space plan is mainly recreational and connects with the regional pathway system and open space sites. The number of recreational opportunities is somewhat limited by operation and maintenance costs so private facilities are being introduced through developer-led, private initiatives funded through Homeowner Associations.

OS.3 Local open space must provide a variety of opportunities for people of all ages, interests and abilities.

The SSS recommended detailed open space planning at the ASP stage however this has not occurred. Wetland areas that can be incorporated into the stormwater management system are identified at the ASP stage and are integrated into the open space system.

ASP policy directs to design parks for accessibility and various recreation functions. Due to maintenance cost concerns, the Parks department has begun to limit the minimum size of parks to provide for flexibility of use and economical maintenance costs. The types of recreational opportunities is somewhat limited by operation and maintenance costs so optional amenities are introduced through developer-led initiatives funded through Homeowner Associations.

OS.4 Joint use sites (elementary/junior high school and playfields) should be located in proximity to the community centre or neighbourhood nodes, on the transit route and close to daycare and other services.

The locational relationship between joint use sites and community centres or neighbourhood nodes that provide supportive retail and services is weak. Joint use sites are often located on collector streets and the number of activity centres that actually provide supportive retail and services is low. 65-70% of Municipal Reserve is

traditionally designated for school sites (Interviewee #7, 2007). Recent changes to the school site model and field size requirements for the Mahogany plan reduced this to 40-45% of total Municipal Reserve area. The large proportion of Municipal Reserve being designated for joint use sites limited the ability to incorporate and design open space throughout new communities. The sharing of sites and buildings with other public agencies has not been achieved and requires considerable coordination. School locations are determined to maximize the ability for students to walk to the sites however surrounding road standards affect the pedestrian-orientation by focusing on the automobile accessibility in the design and standards.

OS.5 The community centre must accommodate a community hall or similar facilities and contain functional public open space.

The SSS required that the community hall be located in the community core. McKenzie Towne is the only case study community to locate a community hall at the community core. Public open space is located at the cores but private and public uses are located on large parcels that are often separated by significant road corridors.

OS.6 Opportunities for long-term community financing and involvement in the design, construction, operation and maintenance of community facilities or local open space should be pursued.

Homeowner Associations are common as a means to finance optional amenities. No other organizations or practices have developed to promote citizen involvement in the planning, operations, and maintenance of open space.

OS.7 Opportunities for shared use of sites and/or buildings for public facilities (e.g., fire, emergency services, library, police, schools, community facilities, social services, health services, etc.) should be pursued.

The City of Calgary has succeeded at sharing sites for public facilities at a regional scale but not at the community or neighbourhood scale. Regional facilities are located in the RPP. Community and neighbourhood facilities, such as schools and community halls have not incorporated the concept of shared use of sites and buildings.

Findings Summary

Various recreational opportunities are provided by community open spaces however private recreational facilities are increasingly common. The planning process does not complete detailed open space plans until the Outline Plan stage. Conservation in new communities has focused on wetland areas. New community plans commonly incorporate natural wetlands into stormwater management systems and as amenity areas.

Housing: Providing More Choice

Key Policy Summary

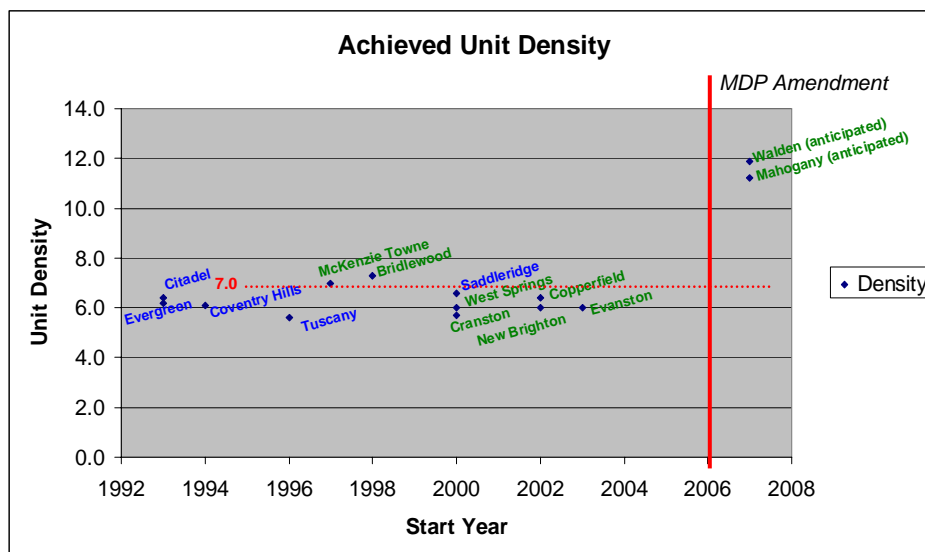
In order to support transit use, local commercial viability and use the land base more efficiently, residential development must be achieved at sufficient densities and at strategic locations. The *Sustainable Suburbs Study* promotes that cores and nodes be planned as transit-oriented activity centres. A graduated density form around the

core and nodes was to focus density around areas of amenity and support alternative transportation modes.

Key Findings by Policy

H.1 All Communities must achieve a minimum density of 17.3 units per gross ha (7 units per gross ac).

The minimum density required in SSS policy was not directly required in post-1995 ASP's but rather a density range between 6 and 8 upa was specified. In 2006 the *Calgary Plan* policy was amended to require a minimum unit density of 7 upa while eliminating any maximum density figure for new communities. An analysis of the achieved densities in recently completed or developing communities indicates that communities planned and developed after 1995 have achieved densities over 6 upa though the majority have not achieved a unit density as high as 7 upa. Around 2005 Calgary's real estate market underwent a dramatic increase in housing prices in which new single-detached home prices increased 48% from \$302,158 in September 2005 to \$448,148 in July 2007 (Canada Mortgage and Housing Company, 2007). During this time period the unit densities applied for in new communities increased. As indicated by the most recent Outline Plans approved, new community unit densities are anticipated to surpass the 7 upa minimum of the SSS, with a plan like Mahogany having an anticipated density of 11.2 upa.



H.2 All communities must provide a wide choice of housing types in addition to single family. Buildings should be predominantly oriented to the street and be compatible in architectural style and finish.

Though multi-family dwellings are noted as a potential form of housing in new communities, ASP policy still indicates new community housing forms to be predominantly single-family. New community policy does not include any targets regarding housing split like those provided in the SSS.

The case study communities all incorporated between the 20-60% target range of multi-family dwellings outlined in the SSS. Housing design and orientation was

promoted in the performance criteria to be oriented predominantly toward the street. The large multi-family sites often tend to be focused inward and not well-integrated into the streetscape. Innovative housing types such as secondary and granny suites have developed only under Direct Control district in McKenzie Towne and Garrison Woods.

H.3 Policies and guidelines ensuring that an adequate choice of low to medium income housing is provided in suburban communities shall be developed as part of a new comprehensive city-wide package of policies on affordable housing.

There has not been a city-wide package of policies on affordable housing developed. In the SSS as an interim measure, pending the introduction of the proposed policy on affordable housing, developers were encouraged to target a minimum of approximately 10 percent of all dwelling units (any type, excluding additional dwelling units) in a community at households earning no more than the median Calgary household income (City of Calgary, 1995b, p. 49). This target was not included in ASP policy. Most ASP's indicate affordable housing, non-market housing as a potential housing type but the market or public has not provided this housing type.

H.4 Most multi-family housing should be located near community centres, neighbourhood nodes, recreational areas or other public amenities and be close to transit stops.

The performance criteria of the SSS intended to locate multi-family development near amenities and services to provide for daily needs however in the case study communities an average of about 50% of the multi-family development is within 400m of the cores or any retail or commercial services.

Findings Summary

The achievements in increasing the minimum unit density of new communities have been gradual. A minimum of 7upa was not required in ASPs and the *Calgary Plan* amendment regarding unit density was not made until 1996, following the housing price changes in the Calgary market. Unit density research in Calgary's new communities indicates that the increased densities are being met through smaller single-family lot sizes as well as an increase in multi-family developments (City of Calgary, 2006d, p. 34). The trend to smaller single-family lots does not contribute to the policy intentions of a graduated density pattern and activity centres. It has also been noted that though unit densities are increasing, population density is remaining flat as the number of people comprising households decreases (City of Calgary, 2006d, p.34).

Transportation: Encouraging Walking, Cycling and Transit

Key Policy Summary

The Sustainable Suburbs Study aimed to reduce reliance on the private automobile and the need to drive outside the community. The intent was to design suburban development to be more compatible to less costly forms of transportation such as transit, walking and cycling through the provision of greater land use mix within the community as well as more convenient and better-serviced alternative transportation modes.

Key Findings by Policy

T.1 The street system in a community must provide all residents with direct links between key community focal points (community centre, neighbourhood nodes, schools, open spaces, major entrances).

The number of access points into new communities is limited upon transportation guidelines regarding access onto major arterial roadways. New community boundaries tend to be arterial roadways which limit the number of access points to the community based on arterial roadway design. Bus-only access is not used in the new communities in the case study analysis so transit routes use the limited number of access points provided to automobiles. The limited number of access points and current road standards then require larger roadways within the community leading to these access points and most focal points due to limited access routes and the assumption that planners must provide significant service for automobile traffic. Larger and fewer roadways within the communities limit the pedestrian orientation of the design and development. Community cores are located on collector roads which minimizes the number of routes to such a major community destination because small local roads are funneled into a larger road standard surrounding activity areas like a core.

Curvilinear street patterns continue to dominate in new community planning. The size of roadways affect the walkability of the community and many roads provide sidewalks on only one side of the street, reflecting a lack of consideration for pedestrians in community design. Direct pedestrian and bike access is provided by various pathways within the residential development rather than by direct access along the street system.

T.2 The transit system must be integrated into the community design and be a key component of the community centre, neighbourhood nodes and other community focal points.

The SSS intended for transit stops and route locations to become a foundational planning tool that would be determined early in the planning phase, at the ASP stage. This has not happened as ASPs do not include transit route information. At the Outline Plan stage the transit route is determined along the pre-determined road network.

ASPs note that cores and nodes should include a transit stop however in development this is not translated as the SSS criteria and guidelines intended. According to the SSS, integrated transit stops would include various amenities within the transit-waiting environment and be incorporated with the surrounding buildings and street. Current land use planning policy lacks clarification as to the criteria of an integrated transit stop.

The SSS intended for planning to incorporate strategic transit hub locations and road patterns that would provide efficient transit routes. The travel distance required by transit and number of stops has increased in new communities while population density is lacking to support transit service. Transit service standards have ensured that more than the 85% of units required by the SSS are within 400m of a transit stop by accommodating residential development locations and locating stops accordingly.

The SSS noted to incorporate regional transit facilities into the community core. As regional transit facilities, LRT station locations are planned and located on arterial roadways. Present community boundaries are based on arterial roadways and therefore this limit the ability to incorporate regional transit facilities into a central activity hub or community centre. In recent new community Outline Plans the station planning area also incorporates the commercial core, even though station areas are not centrally located in the community.

T.3 A new package of street design standards (road hierarchy, width, right of way, boulevard and intersection design, landscaping) must be developed to meet the needs of pedestrians, cyclists and transit-users, while continuing to provide for vehicle transportation.

The policy recommended that new street standards be developed. After adoption of the SSS a team was established to produce a 1997 Street Standards Report which was not adopted by Council. The City of Calgary administration then focused on producing new Collector and Major Road Standards, approved in 2000. New Residential Road Standards that encompass many of the objectives of the SSS, such as sidewalk and street tree requirements, were approved in 2006.

Findings Summary

The intent of integrating alternative modes of transportation in new community design was applied in a non-comprehensive manner which did not enhance the efficiency of alternative modes of transportation in relation to the private automobile. The recommended process change requiring the planning of transit at the ASP stage did not occur, rather the collector roads are indicated at the ASP stage and transit planning takes place at the Outline Plan stage.

Environmental Issues: Reducing Waste and Pollution and Conserving Energy

Key Policy Summary

Design and build communities with less environmental impact by reducing residential, commercial, institutional and construction waste and water and energy consumption. Potential waste management practices for new communities were reflected in the SSS policy. Policies encouraged energy-saving techniques in the orientation and design of sites and buildings and water saving features in new construction. Also, it was encouraged to incorporate stormwater management facilities into the open space plan, to assist with the management and treatment of runoff as well as to enhance the aesthetic amenity of new communities.

Key Findings by Policy

E.1 Builders are encouraged to ensure that all new buildings in new communities are audited for construction waste.

E.2 Builders are encouraged to use recycled materials in the construction of new buildings when supplies are available, existing standards allow, and the cost of materials is feasible.

E.3 Provision for a recycling depot must be included in the design of the community centre.

E.4 Builders are encouraged to equip all buildings (residential, commercial and institutional) in new communities with bins for sorting recyclable dry

waste (paper, plastic, metal and glass) and to locate a permanent composter on site for degradable wet waste and yard waste.

E.5 As part of the future Integrated Solid Waste Management Plan, the feasibility of waste limits and/or yard waste bans will be determined.

The outcomes of many of the waste management policies focused on the responsibilities of the construction industry and Waste Management business unit. There has been very limited progress towards the SSS waste policies. It has become common practice to incorporate community recycling bins within a community core.

E.6 All homes in new communities should have water meters and manufactured water-saving fixtures.

Land use planning does not have powers over construction practices and were therefore unable to implement such policies. However, it has been identified that the policy intentions were achieved through utility bylaws pursued by Water Resources rather than land use planning policy. Water Services has promoted water efficiency through various programs and regulated standards. In 2002, City Council passed amendments to the Water Utility Bylaw requiring that residential customers be metered by the end of 2014. By December 2005, more than 77% of residential customers had been metered (City of Calgary, 2006d, p. 9). Water Resources also successfully regulates the water efficiency in new construction by mandating water-saving fixtures. No direct land use planning practice relate to the suggested SSS policies or intentions.

E.7 Alternative methods to traditional stormwater management techniques must be examined, in terms of appropriateness and cost, for use in new communities.

The planning process has assisted in stormwater management by indicating the requirement to consider alternative stormwater management techniques early in the planning process.

Wetlands are used for stormwater management purposes in new community developments and incorporated into the open space plans. Stormwater retention ponds and engineered wetlands now add aesthetic value and amenity in new communities. There are current developer-initiated plans to incorporate more extensive low-impact development practices in the new development called Walden. There are numerous other methods that can be incorporated in passive open space in new communities as well as design choices to reduce impervious surfaces and traditional parks maintenance which have not been applied in Calgary.

E.8 Builders are encouraged to design, locate and construct all buildings in new communities with the objective of reducing energy consumption.

It is recognized that all energy-related initiatives are voluntary and developer-led at this point. There has not been any comprehensive practices in new communities for energy saving. Various rating systems dealing with resource issues in construction incorporate energy reduction-related targets, i.e. Built Green and LEED promote alternative energy through their programs.

Findings Summary

Waste management practices acted on through land use planning is the location of community recycling bins. Water metering and water-saving features are incorporated into new residential construction. There is a lack of leadership around energy consumption and use in current provincial building standards or land use planning. The integration of wetlands for stormwater management and the Best Practices in stormwater management policies are included in ASPs. Wetlands have increasingly been incorporated into stormwater management systems.