

# PLANNING SUSTAINABLE COMMUNITIES

**Cities, Policy & Planning**  
research series





# PLANNING SUSTAINABLE COMMUNITIES

DIVERSITY OF APPROACHES AND IMPLEMENTATION CHALLENGES

EDITED BY

**Sasha Tsenkova**

**Cities, Policy & Planning**  
research series



ENVIRONMENTAL | UNIVERSITY OF  
**DESIGN | CALGARY**

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## Contents

|   |      |
|---|------|
| Preface   | vii  |
| Contributors  | ix   |
| Acknowledgements  | xiii |
| <br>  |      |
| 1. Planning Sustainable Communities: Implementing the Vision<br><i>Sasha Tsenkova with Bela Seal</i>  | 1    |
| <br>  |      |
| 2. Future Cities: Experiments in Sustainable Urbanism<br><i>Thomas Schroepfer and Limin Hee</i>   | 15   |
| <br>  |      |
| 3. In the Quest of Sustainable Communities: A Theoretical Framework<br>to Assess the Impact of Urban Regeneration<br><i>Catalina Turcu</i>  | 37   |
| <br>  |      |
| 4. Sustainable Urban Decentralization Through Climate Integrated<br>Design<br><i>Arjan van Timmeren, Dick Sidler and Marleen Kaptein</i>    | 67   |
| <br>  |      |
| 5. Spatial and Market Ambiguities of Densification in Activity Centres:<br>Case Study South East Queensland<br><i>Mike Gillen</i>           | 85   |
| <br>  |      |
| 6. Evaluating Transit-Oriented Development Using a Sustainability Frame-<br>work: Lessons from Perth's Network City<br><i>John L. Renne</i> | 115  |
| <br>  |      |
| 7. Social, Economic and Environmental Impacts of Second Homes in<br>Ireland<br><i>Michelle Norris and Nessa Winston</i>                     | 149  |
| <br>  |      |
| 8. Sustainable Transformation of Toronto's Waterfront<br><i>Lisa A. Prime and Anna Palamarchuk</i>  | 169  |

9. Tools for a Sustainable Built Environment: Guidelines for Subtropical Design 179  
*Rosemary Kennedy and Rachel Katoshevski-Cavari*
10. Sustainable Community Planning and Evaluation in Calgary 197  
*Sasha Tsenkova and Rose-Mary Damiani*
11. The Edge at Davy Lands 225  
*Taryn Hayes, Marlis McCargar, Leita Martin, Shana Roberts, Peter Schryvers*

## Preface

Sustainable community development is essential to the long term health of cities today. Our resources are finite. At Hopewell we are committed to creating communities that meet the needs of today's homeowners, while respecting the history of the land and the environment. We also recognize the importance of creating communities that are sustainable and that respect the greater good of the city where we are building.

Community creation is a complicated business requiring knowledge in the areas of community planning, engineering, environmental science, social science, human behavior, architectural design, construction, safety and sustainability. The business requires passion, intensity, commitment and an ability to balance the needs of many including homeowners, administrators, politicians, countless approving authorities and a myriad of other stakeholders. The risk/reward equation is heavily weighted on both sides.

The chapters in this book speak to the importance of the community planning process and its need to focus on sustainability, the challenges that can exist with implementing community plans and need for evaluating built communities. This dialogue is important to ensure that community sustainability is achieved and the intended outcomes are realized. Healthy debate and understanding can come from exploring communities that are successful and those that are not and why. There is great value to those creating communities in this type of research.

Creating communities is an awesome responsibility that we do not take lightly at Hopewell. Any way we can learn more about how to better develop communities and to challenge the status quo we are prepared to do so. We see ourselves as a community advocate; helping to design and build the dreams of each homeowner by establishing a powerful community DNA. The Hopewell difference is the community spirit and social code represented by its learned and creative *design*; its respect, nurturing and incorporation of the *natural environment* and the resultant *anthropology*, characterized by the community's diversity, ease of lifestyle, social connectivity and humanity. Hopewell communities are living legacies, which provide

residents with the best potential for community vibrancy, enduring value and sustainability.

We, once again, were delighted to work with Professor Tsenkova to create a learning opportunity for students. The project, as discussed in chapter eleven, created a framework for experimental learning and discourse on a wide range of strategies to pursue sustainability in the planning of suburban communities. The resultant conceptual land use plans were insightfully done and will be a tremendous resource for Hopewell as we plan for the development of these lands in the future. Congratulations to the students on their commitment to planning innovation and to all who have authored chapters in this book.

**Lesley Conway**  
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## Acknowledgements

Sustainable cities are places that build on their assets and have a strong sense of place. People that live in these cities value healthy ecosystems, use resources efficiently and actively seek to retain and enhance a locally based economy. Planning in these communities is engaging, inclusive and constructive. The book explores these issues of great importance to the global agenda of the 21st century in a number of global cities. It features a diversity of planning approaches from Australia, Canada, Germany, Ireland, the Netherlands and the United Kingdom with a particular emphasis on strategies and tools to facilitate the implementation of sustainable community plans. This unique collaboration of academics, researchers, planners and practitioners was made possible by a grant from Hopewell Residential Communities. My warmest thanks to all contributors for their intellectually stimulating research presented in this book and for their dedication to achieve a high quality scholarly publication. My appreciation also goes to all colleagues who collaborated on this project and contributed to its success—Bela Syal, Lesley Conway, Brad Wright, Chris Elkey, John Lewis and Richard Parker.

Special thanks to my class of graduate planning students at the University of Calgary who embraced the challenge of ‘learning by doing’ and developed a conceptual community plan for Davy Lands. Their vision for a community on the edge presented in the book incorporates a critical reflection on planning policy tools and instruments to plan and build sustainable communities. The grant from Hopewell Residential Communities has contributed to the intellectual direction of the Cities, Policy & Research lab as well as promoted further inquiry into innovative planning tools to implement sustainability in practice. More importantly, it has facilitated the inclusion of planning for sustainability in the university curriculum through experiential learning and exposure to the real world of international planning practice.

Dr Sasha Tsenkova  
March 2009



## **Planning Sustainable Communities: Implementing the Vision**

*Sasha Tsenkova with Bela Syal*

Increasing recognition of the importance of sustainable development in an urbanizing world has directed the attention of planners, developers and policy makers to sustainable urbanism. The ideas behind these new approaches relate to revitalization of cities, to more efficient growth management that improves the physical, economic, and social environment as well as to strategies to plan and create vibrant, livable communities. While understanding that effective growth management strategies vary across cities depending on development history, geography, demographic and economic context, much can be learned from the analysis of planning experiments to build sustainable communities, particularly in a comparative perspective. This chapter explores the evolution of major planning approaches for urban growth management focusing on Smart Growth and New Urbanism and their impact on the planning of new communities in Calgary. These approaches promote new policy strategies to manage growth in a cost effective way, create livable communities, and preserve healthy ecosystems.

### **Approaches to Sustainable Community Planning**

**Smart Growth** has been adopted by cities and municipalities across North America with a fair degree of flexibility and adjustment of the original ten principles (Box 1.1). Smart Growth advocates the development of plans and programs designed to influence the rate, type, location, and the cost of growth. It focuses on balancing competing land use objectives, on integrating transportation and land use planning as well as on measures designed to control and to stimulate growth (Tsenkova 2006). Within that context, the challenge of its practical implementation is often associated with the effectiveness of smart growth planning and design in the suburban environment. The new communities guided by these principles provide

places for people to live, work, and shop and engage residents in more sustainable community practices—energy saving and composting, community gardening, green initiatives, etc. Recent examples of livable communities that are more balanced in function, create inclusive housing supportive of home-based businesses, facilitate walkability and promote access by public transit have strong implications for sustainable urban planning and design.

The popularity and acceptance of the Smart Growth movement in Europe and North America, as well as the wide adoption of its principles, have shown that a systemic approach to growth management sensitive to geographic and cultural contexts is needed to reinvent cities as ecologically, socially and spatially attractive places. Notwithstanding such evidence of its success, criticism advanced in the literature is related to the effectiveness of implementation of Smart Growth principles and the consistency of implementation tools (Bourne 2001; Downs 2005). The implementation gap is attributed to the lack of political will, higher development risks and traditional consumer preference for single family suburban homes (CMHC 2005).

**Box 1.1.** Smart Growth Principles

***Ten Principles of Smart Growth***

- Mix land uses.
- Take advantage of compact building design.
- Create a range of housing opportunities and choices.
- Create walkable communities.
- Foster distinctive, attractive communities with a strong sense of place.
- Preserve open space, farmland and critical environmental areas.
- Strengthen and direct development towards existing communities.
- Provide a variety of transport choices.
- Make development decisions predictable, fair and cost-effective.
- Encourage community and stakeholder collaboration in development decisions (Smart Growth Network 2006)

**New Urbanism** adopts many of the Smart Growth principles but emphasizes the importance of urban form and structure. Its original concept was founded on concerns regarding the placelessness of suburbia, the segregation of land uses and the negative environmental effects of automobile traffic (Congress for the New Urbanism 2000). *The Charter of New Urbanism* (1996) advocates high quality urban design, pedestrian friendly environments, attractive streets, parks, and squares. It promotes the mix of uses, fine grain design, connectivity, order, coherence and visual understanding and sense of place (Grant 2006). New Urbanism reverts auto-

dependency with transit-oriented development on urban infill, suburban greenfield and grayfield sites. The 'transect' has been more recently developed to order the cross-section of a city through a gradient of six zones with gradually increasing density from the natural hinterland to the urban core. Urban plans and policies in Canada developed during the last fifteen years reflect some of these principles such as mixed use, transit-oriented, high density development, quality design and flexible zoning (Gordon 2003). While New Urbanism has been a success in some suburban communities, particularly its aesthetic of front porches and heritage styles, it is not usually accompanied by higher density, transit-oriented developments. A recent survey of 42 case studies in Canada indicated that several New Urbanism principles were less successfully implemented:

- Achieving a mix of housing types at the block-face scale.
- Establishing viable commercial districts within the project.
- Including a reasonable share of affordable housing.
- Enhancing project densities above twelve units per acre.
- Creating communities that do not rely on the automobile.
- Developing fully connected street systems (Grant and Bohdanov, 2006:121).

A new system of **Leadership in Energy and Environmental Design (LEED) for Neighbourhood Development (ND)** takes the approaches of Smart Growth and New Urbanism further. In 2007, the U.S. Green Building Council (USGBC) in partnership with the Congress for the New Urbanism and the Natural Resources Defense Council released the Pilot Version of LEED ND Rating System. Administered by the U.S. Green Building Council, the system evaluates both the design and the construction procedures of new development on infill and greenfield sites (Newberg 2005). The purpose of LEED ND is to encourage developers to create new development that will "revitalize existing urban areas, reduce land consumption, reduce automobile dependence, promote pedestrian activity, improve air quality, decrease polluted stormwater runoff, and build more livable, sustainable, communities for people of all income levels." (USGBC, 2007: 1). The program is currently in the process of evaluating pilot projects and will be launched in 2009. There are currently 238 pilot projects, 21 of which are in Canada (USGBC 2008).

The rating system places emphasis on credits in the following areas:

- Location efficiency: encouraging new development to occur in places where there is already access to services and amenities such as transit, walkable commercial development, existing municipal services, etc.

- Environmental preservation: protecting wetlands and watercourses, wildlife habitats and endangered species, and sensitive or valuable agricultural lands.
- Design and construction elements: utilizing technologies and design to improve the human experience of the urban environment.
- Resource efficiency: increasing efficiencies in the materials used for construction, as well as efficient electricity generation, water treatment, and waste management (USGBC 2007).

## Implementation Trajectories

Calgary is one of the fastest growing cities in North America. The pace of that growth in recent years has created significant challenges associated with land development pressures, demand for higher investment in infrastructure, shortage of affordable housing and suburban expansion. The City of Calgary is committed to efficient growth management guided by sustainability principles adopted in 2007. Box 1.2 documents a high level commitment on behalf of city politicians, planners and policy makers in that regard. There is a considerable overlap with the ten principles of smart growth.

### Box 1.2. Sustainability Principles of The City of Calgary

- |   |
|---|
| <ul style="list-style-type: none"><li>• Create a range of housing opportunities,</li><li>• Create walkable environments</li><li>• Foster distinctive, attractive communities with a strong sense of place</li><li>• Provide a variety of transportation options</li><li>• Preserve open space, agricultural land, natural beauty and critical environmental areas</li><li>• Mix land uses</li><li>• Strategically direct and manage redevelopment opportunities in existing areas</li><li>• Support compact development</li><li>• Connect people to goods and services locally, regionally and globally</li><li>• Provide transportation services in a safe, effective, affordable and efficient manner that ensures reasonable accessibility to all areas of the city for all citizens</li><li>• Utilize green infrastructure and buildings.</li></ul> |
|---|

A number of higher level policy reviews and strategic plans place an explicit emphasis on new approaches to the planning of sustainable com-

munities such as the *Sustainable Suburbs Review*, *Smart Growth Rating System* and *Environmental Footprint Project*. Ultimately the City is promoting sustainable low impact development with an emphasis on fiscal, environmental and social sustainability. Figure 1.1 schematically outlines a series of planning tools and approaches to achieve sustainability in the three major domains ranging from compact development and sustainable infrastructure to pedestrian oriented development, green initiatives, healthy lifestyles and social interaction. Ultimately the implementation of such alternatives reduces capital and maintenance costs, minimizes environmental impact and contributes to social equity.

Three case studies demonstrate a trajectory of development and evolution towards more sustainable communities in Calgary. McKenzie Towne, Currie Barracks and Mahogany illustrate the incremental progress achieved through the planning and design process as well as its implementation challenges.

**Figure 1.1.** Planning Approaches to Achieve Sustainability in Calgary



Source: Walden, Genstar Development Company

### **McKenzie Towne**

In 1995 McKenzie Towne was Canada's first New Urbanism master planned community (Gause, 2002). Planned by Andre Duany and Eliza-

both Plater-Zyberk, the community was built on 2400 acres on the edge of the City of Calgary with a target density of 6 units per acre. Developed by Carma—a single corporation—the community pioneered many innovative concepts requiring special design, planning and engineering approval.

The community has four villages, each with a central park and a variety of architectural styles. The commercial main street consists of an array of shops, services and community facilities. Although the forty-six acre town centre is designed to include office spaces, the market will ultimately determine what commercial uses will be provided. McKenzie Towne implemented storm water retention plans to reduce the demand on city-built infrastructure. Components from traditional neighbourhood design were applied, including front porches, decreased front setbacks, granny homes, and treed boulevards with pedestrian friendly environments (Tsenkova, 2006).

**Figure 1.2.** Mixed-use Development in Garrison Woods and Multi Family Complex in McKenzie Towne



A small share of multi-family units is available in close proximity to the town centre. The first two villages of McKenzie Towne were designed to integrate various housing types—townhouses, walk-up apartments, single family homes with granny suites—as well as promote community interaction through pathways and connectivity of open spaces. Upon completion in 2015, McKenzie Towne is expected to contain 6,500 housing units



home to 20,000 residents. It is recognized for its architectural design, streetscapes and compact development form.

### ***Currie Barracks***

Currie Barracks is a former Canadian Forces Base located in the inner city of Calgary. The project has received LEED ND Gold certification for its Community Plan (CLC 2008a). The 200 acre site has been redeveloped into a mixed use community with 3,200 homes, 200,000 square feet of retail space, and 300,000 square feet of office space. At build-out, Currie Barracks is expected to host 2,500-3,000 jobs with an expected completion in 2018. The site is designed with a target of 16 units per acre and 14 heritage buildings are preserved and integrated into the new community. The Community Plan, developed by Brown and Associates, is guided by New Urbanism principles. It aims at efficient site planning, walkable streets, mixed-use neighbourhood nodes with schools, parks, shopping within walking/biking distance and convenient access to bus routes (CLC 2008b).

These design aspects as well as the implementation of architectural guidelines by Canada Lands Corporation enhanced the historic character of the development and contributed to a high quality public realm. Canada Lands Corporation also created a planning process, which enabled a pragmatic balance between market forces, community need and city policies to encourage more environmentally sustainable development. The implementation had its own challenges, starting with changes of city standards and regulatory processes during the initial phase in Garrison Woods to allow for greater innovation in design and new approaches to urban infrastructure.

### ***Mahogany<sup>1</sup>***

Calgary today is at cross-roads and going through a soul-searching experience. Processes like '*ImagineCalgary*' and '*Plan-It*' are striving to set a vision for Calgary for the next 70 years. Once this vision is put in place, the next and more challenging step will be to implement the vision. The vision must stand the test of the market in order for it to become reality. It will need the resolve and commitment of municipal representatives, buy-in from the public and the confidence of the risk-takers (builders and developers) in its ability to lead the change.

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<sup>1</sup> Excerpt written by Bela Syal.

Smart Growth is at the core of this vision. Inner city intensification and smart suburban communities are fundamental aspects of implementing the vision. Over the past several years, the planning for Calgary's suburban communities has made significant strides in this direction. The plan for Mahogany, a new community located in southeast Calgary, is a result of an innovative and integrated process between the developer, Hopewell Residential Communities, the planning consultants, Brown and Associates, and the City Planners. Following are the key smart growth principles integrated in the community of Mahogany (see Figure 1.3).

**Figure 1.3.** Smart Growth Principles in Mahogany



*Compact development and an inclusive community.* With an overall density of 10 units per acre, Mahogany sets the stage for intensification of suburban communities in Calgary. To put this in perspective, the communities built in the 1970s and 1980s achieved a density of 4-6 units per acre, while in the 1990s, 6-8 units per acre was stipulated by the City. The suburban communities today are planned to be twice as compact as the communities two decades ago. The higher density comes with a higher percentage of multifamily residential, which caters to the needs of a broader socio-economic group. Inclusive communities offer housing products at various levels of affordability and for a range of demographic groups. It should be noted however, that recently approved communities with densities 10 units per acre or greater have not yet been implemented. Their suc-

successful implementation to a large degree will be determined by the public's willingness and support to live in more compact forms of housing including condominiums and townhouses.

*Alternative travel choices: Transit, walking and bicycling.* Providing alternative choices for travel other than the automobile, is fundamental to long term sustainability. The Mahogany plan consists of a strong mixed-use high density Transit –Oriented Development (TOD) adjacent to the future LRT station. The mixed-use core will promote transit usage by accommodating higher density residential developments and local commercial services. The community design integrates a radial system of direct street connections to key destination areas such as schools and recreation amenities throughout the community. A comprehensive open space system further promotes walking and bicycling.

*Environmental sustainability and low impact development.* Preservation of natural features and integration of low impact development (LID) principles for storm water management has become a key element of new community design. The ultimate intent is to maximize the quality and minimize the quantity of storm water discharge into our river streams. The Mahogany plan integrates a large wetland complex into the storm water system to create a bio-diverse eco-system. The wetland complex is located adjacent to a school site thereby enhancing the educational benefits of the interpretive trail and nodes proposed in the complex.

*Mixed-use complete community.* The intent of this principle is to plan and build communities which cater to the daily needs of its residents, minimizing the need to travel outside of the community. The urban core in Mahogany is envisaged as a vibrant mixed-use area which will include recreational, shopping, institutional and educational facilities in addition to higher density residential. The Seton Employment Centre, which includes the South Health Campus, is located immediately to the southwest of Mahogany. It is recognized that given the complexity of the job market, it is difficult to achieve the objective of balancing housing with local work opportunities. The goal, however, is to maximize the opportunity to house people close to where they work to the extent possible.

*Legibility/Sense of place.* Legibility and orientation are sometimes difficult qualities to achieve in largely homogeneous communities with few visual landmarks and nodes. Closely related to these intangible elements is the creation of a sense of place, which fosters a sense of belonging to the community. Through the proposal of distinct neighbourhood nodes and

Figure 1.4. Mahogany Community Plan



landmarks at key focal points, the Mahogany plan strives to create a legible community, which provides a sense of orientation to its residents. The urban core, enveloped by a three-part lake with public jogging paths at the interface, will serve as 'Downtown Mahogany'. The focal point of the urban core is the Central Green.

The success of implementing the above principles will be subject to the dynamics of numerous external factors and to the prevailing market forces. Flexibility of the plan to respond to these forces without compromising the overall vision will be the true test of our readiness for change. Each of the three communities reviewed in this chapter are considered to be successful and address different aspects of sustainability, thus creating a development pattern with different strengths and weaknesses.

## Conclusion

During the 1960s, the movement of people away from urban centers led to the evolution of the suburban residential neighbourhood, and ultimately to strip commercial and office development. Continuing demand for lower density housing resulted in consumption of large tracts of land at the expense of the environment and the increasing economic and social costs (Fischler 2004; Galster et al. 2001). In recent years, there have been concerted efforts in Europe and North America to deal with the urban sprawl that resulted from unchecked development and laissez-faire attitudes (Benfield *et al.* 2001). The challenge in the future is to accommodate growth through development that is marketable and economically feasible; development that is guided by the principles of Smart Growth; development that creates a sense of community and identity through effective planning and design solutions (Tsenkova, 2006).

This book presents a range of planning approaches to create sustainable communities. The experience at the local and international level indicate a growing commitment to change and new patterns of development that protects open space and farmland, revitalizes communities, keeps housing affordable and provides more transportation choices. In the physical form, this is characterized through the preservation of ecologically sensitive areas, floodplains, and agricultural land with the provision of compact development offering a diversity of uses serviced with public transit.

The new planning approaches are guided by the vision for sustainable cities as places that build on their assets and have a strong sense of place. Although community plans in Calgary and other cities featured in this book create a bold vision for new sustainable communities that are compact, transit oriented, and diverse in terms of housing choices and neighbourhood amenities, the implementation process tends to be challenging and often diverges from the original concept. The planning policy framework advocates integration of land uses, clustering of neighbourhood activities and environmentally sensitive approach to development. It articulates the need to create a strong sense of place and neighbourhood identity through preservation of the cultural and environmental heritage on the land. However, as many of the contributions in this book point out, defining a market niche is one of the barriers of innovative community development. These communities often challenge regulatory practices, city standards for planning approval and infrastructure provision, and thus developers are required to take an additional risk as well as face delays and higher development costs.

The significant attention that urban growth management receives in different cities today highlights an ongoing debate, which questions the legitimacy of sustainable community planning to address the failure of past attempts to produce livable and sustainable cities (Talen 2003, Porter 2002). The achievements in that regard demonstrate the diversity of implementation challenges in different contexts, the evolution of policy development, public involvement and adherence to a continuous system of values. In the future any city must continue to focus on shared values, and remain flexible to changes in social, physical and economic conditions, as growth, like decline, results in change. The struggle to understand the impact of choices related to smart growth management is likely to persist for planners, developers and local politicians and city residents. Contributions in the book seek to inspire policymakers, planners and designers to learn from innovation in other cities and to experiment with a range of planning tools, know-how and design solutions.

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## **2 Future Cities: Experiments in Sustainable Urbanism**

*Thomas Schroepfer and Limin Hee*

This chapter describes an ongoing interdisciplinary collaboration, which explores possible emerging forms of sustainable urbanism in the 21<sup>st</sup> century. The idea of sustainable cities is examined in more than environmental and ecological aspects, to highlight the emergent forms of urbanism based on new paradigms that inform on the shape of cities to come. The two case studies discussed embody complex topics of design, dwelling, community in space, building technologies, environmental strategies, as well as models of affordability. Comparisons of the two developments allow the authors to draw important lessons in sustainable urbanism, and serve as points of departure to the imagination of future sustainable cities.

### **Introduction**

The idea of sustainable cities is examined in this research in more than environmental and ecological aspects, to highlight the emergent forms of urbanism based on new paradigms that inform on the shape of cities to come. The built experiments discussed embody complex topics of design, dwelling, community in space, building technologies, environmental strategies, as well as models of affordability, but at the same time explore new trajectories in the development of sustainable urban housing. This research is an ongoing interdisciplinary collaboration, which discusses possible emerging

forms of sustainable urbanism in the 21<sup>st</sup> century.<sup>1</sup> This chapter is based on the following case studies:

Case Study 1: Vauban describes the guiding principles and their implementation in the planning and design of a new major development of a sustainable city district: a 38-hectare former barracks site near the town center of Freiburg, Germany that was purchased by the city in 1994 with the goal to convert it into a flagship environmental and social project. Vauban comprises 2,000 homes to house 5,000 people, as well as business units to provide about 500-600 jobs. The project is currently nearing completion and is widely seen as one of the most positive examples in Europe of environmental thinking in relation to urban design.

Case Study 2: solarCity Linz currently comprises about 1,300 homes and 3,000 inhabitants. It was designed as a flagship development for renewable energies in urban design and includes projects by architects like Foster and Partners, Richard Rogers, and Thomas Herzog. Construction time of the nucleus of solarCity took place from 1995 to 2005.

## Case Study 1: Vauban

Freiburg, a university town in the southwest of Germany with some twenty years of environmentally sensitive policies and practices, has often been called the European capital of environmentalism. The purchase of Vauban, a 38-hectare former French barrack site near the historic town center presented the excellent opportunity for the city to build a flagship environmental city quarter. Three phases were planned for implementation between 1998 and 2006, and comprised 2,000 homes for a population of 5,000 plus small businesses to provide 500 to 600 jobs within the quarter (EU-LIFE, 2005). The following section summarizes the ideas and ideals for Vauban (Jehle, 1999).

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***Ideas and Ideals***

**Diversity in Place** – A community to be created in place by achieving a good mix of demographic groups, cutting through different generations, work, culture and abilities - the new, inclusive city quarter is envisioned to comprise privately-financed homes mixed with social housing, without any groups being singled-out.

**Figure 2.1.** Aerial, Vauban



**Design by Choice** – Allotment of small parcels to be developed by different architects working with different client groups allowed for a variety of design solutions based on simple guidelines set by the city authorities. This model enables multiple built solutions developed from the ground-up instead of the top-down planning model, encouraging a sense of ownership and shared responsibility in developing the form of the community.

**Self-organizing Communities** – The integrative approach to shaping the form of the city quarter works through innovative processes and embody an interdisciplinary approach. By articulating their needs and expectations, the community is formed in space even before the first building is erected.

**Open-ended Development** – New layouts that allow for openness for a multitude of uses through flexible planning and design make room for changes in family type, size and composition in the future. The design and

layouts of public amenities and institutions are intended to accommodate changing social needs as the community matures.

**Public Space** – Good public spaces at different scales are created with a strong emphasis on public safety through the design and layouts of these spaces. These spaces form the backbone of the new city quarter.

**Environmental Urbanism** - Clear guidelines for the development of the new city quarter favor environmentally friendly urbanism a new reality – car-reduced neighborhoods both through removing the need for automobiles as well as restrictions to car parking. Tramlines form the backbone of public transportation linking the new city quarter with the rest of the city. For local travel, amenities and public institutions are located within walking distance.

### ***Tools and Implementation***

The ideas and ideals for Vauban had to be translated into comprehensive policies, regulations and initiatives that would lead to the desired results, as well as the formation of citizens' groups empowered to reify the goals of such a development. The following sums up the implementation tools for the development of the Vauban quarter:

**Diversity in Place** – A community to be created in place by achieving a good mix of demographic groups, cutting through different generations, work, culture and abilities. The Freiburg city authorities had been able to achieve their environmental and social aims through planning and building regulations and conditions for the sale of individual plots. These included increased building density, social and functional mixes, flat roof greening, and rainwater disposal within the building boundaries. The requirements for Vauban further some of these aims, some more stringent than national requirements.

**Building Co-operation** – A large part of the success of the Vauban development could be attributed to the ground-up community planning process facilitated by the non-profit organization, Forum Vauban (now Stadtteilverein Vauban), founded in 1994 at the inception of the project as a forum to initiate public participation that went far beyond what was legally required (Schubert, 2006). The *Baugruppen* (groups of future builders) model proved to be crucial for Vauban. The extended citizen participation in Vauban led to a large number of workshops in that participants

discussed topics like designing residential streets, green spaces and energy consumption that often led to suggestions, which were presented to the official planners and often became part of the planning and design of the new district (Fabian, 2006).

**Figure 2.2.** Housing Block, Vauban



**Community Building** – The implementation of joint building projects and public participation through Forum Vauban helped to forge a mix of residential buildings and workplaces. Community relations were built even before physical building (Glatz, 2006). In an attempt to determine a heterogeneous community, a model called *Blockprofil* (block profile) was developed along categories of resident types in terms of marital status, number of children, occupation, etc, to ensure that the desired diversity was fulfilled (Fabian, 2006).

**Programs** – Vauban houses its population not only in new buildings, but also included the use of some renovated barrack buildings as student housing and functions to service the quarter, such as schools, shops and various offices related to the new city quarter.

**Mobility Concept** – Vauban is designed to reduce the need for car-use and to cut overall journey distance. Tram and bus stops are placed not more than 500 m from buildings in the neighborhood. The car parking garages located at the edge of the development support the creation of car-

reduced Vauban – car access is limited and restricted to the main access road. A city bus already runs through the district and in 1998, the city authorities approved the extension of the existing tramline to run the length of the main street in the development, with the plan to enable connection between tram and the rail network in the near future.

**Figure 2.3.** Housing Block, Vauban



Traffic Infrastructure and Public Space – in Vauban, the streets are taken over by a multitude of public functions besides being access roads. On the development's main tree-lined thoroughfare that links the quarter to the city, the street is bounded by a footpath-cum-cycle track, which buffers the housing developments and community gardens. There is a speed limit of 30 km/h on the main thoroughfare, while the side access roads have a limit of 10 km/h and are no-parking zones, aside for set-downs and deliveries. As such, they take on the function of urban courtyards. Shops, offices, medical facilities, and cafes surround the main public square of the quarter. Other types of public spaces include the arcade spaces created by lifting apartments above ground floor businesses and retail units and are fronted by a short-term parking area. The north- and south-end of the quarter have streets, which are entirely residential.<sup>2</sup>

<sup>2</sup> The building regulations of the federal state of Baden-Württemberg made it necessary to invent a legal framework to realize this concept. The *Verein für Autofreies Wohnen* (Association for Car-free Living) in Vauban was founded as a legal body for its implementation.



Green Spaces – Existing trees had to be included in the layout for Vauban. The vegetation of an existing creek was made a conservation area. The new district has a calculated mix of open public green corridors and private green spaces. Three green corridors connect the creek area with the new district in the North. In anticipation that at the completion of the development, the built-up areas would have taken up about half of the surface area of the ground area, provisions for rain water collection in the form of large one meter wide trenches along the streets to ensure that rainwater could be returned to the soil to maintain the natural water table.

**Figure 2.4.** Rolf Disch, Solarsiedlung, Vauban



Environmental Measures – Already the masterplan for Vauban took into consideration many environmental factors e.g. prevailing winds on the site.<sup>3</sup> In the quarter, all buildings must meet the low energy house requirements of an annual heating energy consumption 65 kWh/m<sup>2</sup> or less.<sup>4</sup> With a few exceptions, buildings were restricted to a height of three to four

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With more than 140 households within the first developing section alone, Vauban is one of the biggest projects of this kind in Germany.

<sup>3</sup> There is a stream of cold air coming from the declined slopes of open land uphill of Vauban. Barriers against this stream, which has a very good impact on the local climate conditions, were reduced to a minimum.

<sup>4</sup> The average energy standard in Germany for buildings built between 1995 and 2000 is about 100 kWh/m<sup>2</sup> per year. The standard of older buildings is about 200 kWh/m<sup>2</sup> per year.

floors to ensure good climatic performance in outdoor spaces a good quality of daylight. Many buildings are equipped with solar panels, others have green roofs.<sup>5</sup> Buildings consume about 30 per cent of the energy that comparable but “unsustainable” buildings consume, and 65 per cent of this energy comes from renewable sources. About two thirds of Vauban’s houses are served by a combined heat and electricity plant that is powered by a mix of 80 per cent wood-chips (which are considered a renewable and carbon-neutral source of energy) and 20 per cent natural gas.<sup>6</sup> Also included in the development are buildings designed as passive houses that do not need conventional heating systems. The heat requirements are covered by so-called internal gains, passive solar gains and a technically simple heat recuperation system. The buildings are insulated with 35 to 40 cm of mineral wool or polyurethane and have triple-glazed windows that are coated with a heat-reflective material (Disch, 2006). The buildings are oriented north to south and unobstructed by adjacent plus-energy buildings and produce 15 kW/m<sup>2</sup> per year. Vauban’s environmental performance is monitored by the Institute for Applied Ecology Freiburg.<sup>7</sup>

### **Critique**

The following section evaluates the Vauban project as it is built against the ideals and ideas embodied in its inception. For the sake of the discussion, the ideas are condensed in four thematic areas that raise questions of idea versus actual form. This discussion is still open-ended as many of the observations may have to be quantitatively verified to be used as actual data (Schroepfer *et al.*, 2007).

Community – That Vauban was conceived on the site of former French Army barrack grounds allowed for an experimental community on a site that in parts offered almost a tabula rasa condition. Such a condition both afforded innovation, but to some degree, detachment from the surrounding environs of Freiburg. It is also unclear how well the work-live environ-

<sup>5</sup> The onsite co-generation plant produces 50 per cent of the electricity for Vauban. Photovoltaic devices produce 10 per cent.

<sup>6</sup> Solar PV and other renewable energies still only provide 2 per cent of the power that Freiburg needs. The city currently generates 50% of its electricity from natural gas CHP plants. The rest is imported, including 30% from nuclear. Freiburg’s goal is to decrease nuclear influence and increase the energy from renewable sources to 10 per cent by 2010.

<sup>7</sup> According to the provisional figures of the institute, Vauban produces per year: 28 GJ energy savings, 2,100 tons of CO<sub>2</sub>-equivalent reduction, 4 tons of SO<sub>2</sub>-equivalent reduction, 1,600 tons of mineral resources savings. This is the first time that a complete urban neighborhood is analyzed with respect to all its components.



ment expressed in the brief for Vauban has come to fruition. The employment opportunities within the quarter are few, consisting mainly of operators of the small retail outlets, services providers such as cafes, schools, and a limited number of small offices. The adjacent communities may add to the conviviality of Vauban's center, but it remains to be seen if these communities form social networks. The pluralistic communities mentioned in the ideals translate in the actual quarter to a population that seemed composed of young married couples, middle-class white-collared workers, college students and those who share the similar progressive mindsets. About 17 per cent of Vauban's current population is under the age of 17. Such a demographic also creates demands for amenities for children and teenager, which might become obsolete once this clustered demographic age group outgrows these facilities. It is a rare sight in Vauban to see older persons, or those from more diverse racial and occupational backgrounds.

Urban Form – Vauban's main street corridor, Vauban Allee is about 35 m wide, with a streetcar track and stations situated in the median. If one were to consider the urban scale of the project by analyzing a section through its main street in relation to the buildings on both sides, one would expect such a scale to suggest an urban thoroughfare. Vauban's policy of limiting cars in the precinct seems in contradiction to such a scale. The main street also leads to a dead end on the West of the site, so that the street would not become a vehicular thoroughfare. Such a policy does keep traffic low, but also leads to a cut-off from surrounding neighborhoods. While the clear guidelines for sustainable building leads to interesting and diverse solutions for the house and apartment forms, it is not clear how the ideal of growth could be implemented, as Vauban has clear boundaries.

Environment – Vauban displays a complex network of environmentally friendly planning measures. The accumulation of those best practices has some negative effects on the urbanity and connectivity of the new city quarter. For example, the rather unattractive, one meter deep infiltration trench for storm water runs for the whole length of the boulevard and not only adds four meters to its dimensions, but also hinders the exchange between the two boulevard sides. There would have been opportunities to overlay some of these services and to make better use of the green spaces for rainwater retention. It appears that these eco-technologies and practices have to be further studied in their effects on urban space.

Public Space – The most successful public spaces in Vauban are the small-scale residential streets, which are car-reduced zones, and function as children's play areas. These streets act like extended front porches, and

are often meeting places of neighbors, and provide a good sense of public safety. However, as one moves towards the scale of the main street and the arcaded walkways, a real sense of urbanity is lacking in its public space. Whereas the abundant linear green parks are heavily populated by children, the oversized main street that would have offered the opportunity of a vibrant street life is fairly vacant in the middle of the quarter. It also seems as though there is a lack of critical mass of population to make these areas lively.

### **Case Study 2: solarCity**

The second case study, solarCity, was chosen because it shows many similarities to Vauban: it is a new city quarter in Linz, Austria that aims to have minimal environmental impact through its self-sufficient energy generation systems as well as processes to deal with waste and waste water on site, as well as retaining rainwater within the locale. The experimental community aims to be a model for ecological living at the beginning of the 21<sup>st</sup> century. Built on a site near the historical City of Linz, solarCity is a public housing initiative. The project aims to be on the cutting edge of architectural and landscape design, and is also an exemplar of public-private partnership in achieving the goals of sustainable planning, design and construction (City of Linz, 2007).

The City of Linz and the Austrian planner Roland Rainer commissioned the new city quarter. The brief called for a model residential community with a potential settlement of between 5,000-6,000 homes, using the state-of-the-art eco-technologies. It was to serve also as a living laboratory for low energy consumption. In 1994, the city teamed up with four of the most important non-profit making residential construction organizations in Linz with an agreement to finance and plan the first phase of the model estate with an initial 630 low-energy homes. A further eight non-profit construction organizations joined in 1996 and the initiative was to include 1,317 homes. Based on Rainer's masterplan the first 630 homes were designed by well-known architects such as Norman Foster, Richard Rogers and Thomas Herzog, assisted by German engineer Norbert Kaiser, a specialist in environmental technologies. The sustainable city was to be a model future city to promote low cost building and low energy consumption methods on a worldwide basis. The city held an architectural competition in 1996 for the design of more homes. The winner was the Viennese architect Martin Treberspurg, a solar specialist with experience in public residential

construction (Reinthal, 2007). The following section summarizes the ideas and ideals for solarCity.

**Figure 2.5.** Aerial, solarCity



### ***Ideas and Ideals***

**Site Layout and Traffic** – The sustainability ideals were to examine optimum density, flexibility of housing types and to promote pedestrian and cycle traffic – a car-free environment as far as possible. The network of road and paths would be planned so that cars would be parked in collective garages and the estate connected to the city center via trams, express buses and the Ebelsberg bypass. In the medium term, the aim would be to increase access via a rapid rail system. The natural topography was to be respected in laying out the homes, making most of building orientation and the local climatic conditions. An attractive town center with kindergartens, schools and a multi-function center are planned in the center of the new quarter, not only serving the new district, but also older communities nearby.

**Building Design and Materials** – The buildings would primarily have a linear framework and have a height of two or three stories. The town center would be primarily north-south oriented, with passive environmental

measures effected through atriums and compact layout; active measures include controlled building ventilation and heat recovery systems, underground air pre-heating or cooling depending on the seasons and PV collectors integrated with the roof or façade systems.<sup>8</sup> Excess heat in summer is lessened via covered passages and light deflecting mirrors. A catalogue of building materials based on eco-building principles and criteria is compiled by the builders, who would have to work on the basis of such agreements.<sup>9</sup>

**Community** – In 1996 the Wohnbund Salzburg was commissioned to develop an overall structural plan for a sustainable community for the new city quarter. A mix of housing types, owned as well as size of apartments to be built are determined to ensure a diversity of family types would be able to afford to live in the new quarter. Active participation from the future community was also encouraged, who will also eventually care for the areas in the vicinity of their homes as well as for some public spaces.

**Environmental Measures** – Energy would be not be supplied by the city grid but would come from the widespread use of solar panels and installations that would make the whole city self-sufficient and even return energy surplus to the city grid. A compact layout was favored with buildings largely oriented towards the south, with highly insulating facades, natural ventilation and lighting and optimum storage of heat. Solar collectors with a cover extent of at least 34 per cent would generate hot water.<sup>10</sup>

**Natural and Open Spaces** – The city placed high importance on the environmental impact of the new development on the riverine ecology on the Traun River, but at the same time would like to introduce open and public spaces in the parkland. A landscape design competition was held in 1997 by the city for such development.<sup>11</sup> The *Kleiner Weikersee*, a natural lake

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<sup>8</sup> Generally, the passive solar design includes strategies to maximize solar gains and minimize heat loss and overshadowing.

<sup>9</sup> E.g. the Kindergarten is largely built out of timber. Façades in solarCity include passive solar energy recovery systems, decentralized wall-integrated ventilation devices, wood, aluminum or synthetic material high-quality windows.

<sup>10</sup> It was planned that the development would not be supplied by the city's electricity grid but co-generate its own energy, which would make the neighborhood completely independent and even allow it to return part of its energy surplus.

<sup>11</sup> The project attempts to demonstrate how a city development and nature can be brought together and how its inhabitants can be offered a high standard of living without having the natural environment suffer a result. The project includes preservation of surrounding marshland in its entirety, avoidance of ecological barriers and divisions, preservation of

in the region, would be expanded to create new bathing areas, and a bridge added for pedestrians and cyclists at the narrow crossing. The Traun-Danube riverside nature reserve would be preserved, but made accessible via timber gangways, information stations and a system of paths. Recreation space for the development would include an intensively designed park landscape between the residential and natural areas, with areas for relaxation and recreational activities. An existing stream, the Aumühlbach would be re-established through eco-engineering and would be integrated with the park landscape.

**Water and Waste Disposal** – Within the framework of a pilot project for waste disposal is the waste water-free estate: 106 homes and the school would be fitted with special toilets that would separate grey, yellow and black water. The yellow water would be enriched with nutrients and applied as agricultural fertilizer, while solid waste would be composted. Grey water would be cleaned in sand and reed bed filters and fed into the nearest stream. A rainwater reclamation system using hollows gullies and reservoirs would ensure that rain water is retained in local ground.

**Urban Morphology** – The masterplan for solarCity in many ways are modeled after the Garden City model. Both are designed in a radial form with neighborhood wards in each quadrant. While the Garden City is linked to the Central City via train, solarCity is linked to Linz City via tram.<sup>12</sup> The town center and commercial facilities in both cases are located in the center of the radiant, and the city surrounded by a green belt – in the case of the solarCity, the nature reserves hem in the development almost on three sides, while the existing districts of Ebelsberg and Pichling are on the west and south-west. The development of the solarCity is tightly bound by development regulations for sustainable development and building orientation, while the Garden City models are regulated to control form and spatial environment.

Like the Garden City, solarCity's form and density tend towards decentralization of the city in being a satellite city quarter. However, while the Garden City is developed as a co-op, solarCity is a project initiated by the municipal government as public housing. Nevertheless, the environmental "stake-holding" as well as the participation of the community in shaping

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valuable biotopes, re-admittance of flood water to restore the natural ground water level of flooded marshland, natural forest cultivation, and reduction of noise and emission levels.

<sup>12</sup> Like Vauban, solarCity is designed to reduce the need for car-use and to cut overall journey distance.

the public spaces near their homes allows the community to determine some aspects of the development.

### ***Tools and Implementation***

Like in Vauban, the ideas and ideals for solarCity had to be translated into comprehensive policies, regulations and initiatives that would lead to the desired results. The following sums up the implementation tools for the development of solarCity:

**Building Regulations** – The City of Linz defined a number of building requirements in land sales contracts to achieve important goals for solarCity. These stipulated that all buildings had to be built according to the Austrian low energy building standard that limits heating requirements to 40 kWh/m<sup>2</sup> per year. The city further recommended a catalogue of building materials based on biological and ecological criteria. Further, solarCity's buildings have a height restriction of four stories above ground. Most of the buildings therefore need not be equipped with elevators. For the development of solarCity, the City of Linz entered into contracts with twelve non-profit housing development agencies.

**Community Building** – Social considerations played a dominant role in the design and implementation process of solarCity. The design team was well aware that the creation of public housing for 3,000 people on a green-field site 10 km from downtown Linz posed the high risk of creating an isolated social ghetto. A group of social planners was hired to develop detailed guidelines regarding population mix, appropriate housing types, public infrastructure and open space qualities. They also made recommendations regarding the social implementation process and the integration of the 4,000 inhabitants of nearby Pichling. In their analysis, the social planners recommended the creation of a community whose composition is similar to that of the city of Linz. One key recommendation was to keep the social housing percentage to a minimum and to lower the amount of rental apartments from a projected 85 per cent to 40 per cent in order to increase diversity and decrease fluctuation. Rent-buy options (an apartment can be rented with an option to buy later) were introduced to increase home ownership, which is considered to be the basis for a stable neighborhood.

**Figure 2.6.** Auer+Weber, Aerial, solarCity Center

**Programs** – Besides housing solarCity features a series of other programs including a district center that houses a senior citizens' club, a library, education facilities, a number of event spaces as well as stores, cafes, and restaurants that service the city quarter. Other building programs include a school, a kindergarten, a sports club, a family and a pastoral center. The outdoor program is intensively developed and ranges from small-scale playgrounds and community plazas to a larger landscape park with swimming, sports facilities and a recreational trail system.

**Mobility** – SolarCity is located about 10 km southeast from downtown Linz. The new city sits at the end of a recently constructed tramline. The tram runs quite frequently and the ride to downtown takes about half an hour. There is also a bus that connects the district and its surrounding communities to the small town of Ebelsberg where a commuter train stops on its way to Linz.

The city of Linz also built a new 5 km bypass road for the new city extension in order to establish a fast connection to the center of Linz and alleviate transit traffic in nearby towns. At its end a 2.5 km long and generously tree-lined boulevard integrating cars, tram, bicycle and pedestrians leads to and through solarCity. This boulevard was designated to be the spine for three additional urban nodes east and west of solarCity housing

an additional 9,000 inhabitants. It is yet unclear if these extensions would be built, since housing demand decreased as more land became available in the center of Linz.

**Figure 2.7.** Richard Rogers Partnership, Housing Block, solarCity



Parking garages under the housing units is only submerged about two third into the ground to allow for natural ventilation and light. Entrances to the submerged parking garages are located close to the main boulevard and to the few car accessible streets in the district. This arrangement effectively gives pedestrian and bicyclists more freedom and safety to move above ground. In less frequented areas bicyclists share pathways with pedestrians or cars. In areas with more traffic like the main boulevard, specific bicycle lanes were installed. Outside of the district a wider net of pathways serving pedestrians and bicyclists alike leads to attractions in the larger landscape like the riparian forests of the river Traun, swimmable lakes or to nearby villages.

Urban Design – Viewed from above, solarCity clearly stands out from its surroundings by virtue of its concentric layout. It does not enmesh with the amorphous growth patterns of the periphery nor does it respond to the idiosyncrasies of the larger fluvial landscape. It relates more to itself than to its context. One is reminded of the public transportation diagrams of the masterplan. These diagrams showed four circles with a diameter of 600 m lined up on the main spine, each resembling one of the future 3,000 person



neighborhoods. The street and building layout of solarCity seems to be a direct translation and extrapolation of one of these circles into built form. The design team stressed that the circular layout was meant to physically support the community building effort and to establish a gravitational pull towards the common center in its middle. Other practical factors played a role in the choice of urban form, such as the need to create the shortest possible distances in the quarter through the use of a circular instead of a grid-like arrangement. Today all destinations can be reached in three to five minutes from within the 300 m-radius. Orientation within solarCity is easy. One is always aware of the central node, which acts as an orientation device. As a result, the coral-like arrangement gives the district more the ambience and setting of a village than of a city quarter.

**Figure 2.8.** Foster and Partners, Housing Block, solarCity



The center of the Solar City itself is separated into two halves by the 40-meter wide boulevard aptly named Heliosallee. The architectural firm Auer+Weber bridges this bisection by closely aligning several narrow bar buildings and orienting them perpendicular to Heliosallee. A parallel colored shading structure connects the bars from each side of the boulevard. Thus a unified center is achieved that effectively integrates the boulevard and makes it part of a central plaza. The other buildings line Heliosallee with their short ends, and are in many cases set back to allow access to underground garages. An enlivening exchange between these buildings and Heliosallee is missing and the boulevard runs more like a suburban park-

way than as a vibrant street through most of the quarter.

**Figure 2.9.** Herzog+Partner, Housing Block, solarCity



Inside the district itself, the most direct expression of the radial layout is executed in the long arching housing units designed by Richard Rogers Partnership. Its spatial experience is enriched by the addition of a counter arch that has an astonishing perspectival effect on the ground. Other more recent additions like the public high school try to escape the radial paradigm. The over 100 m long school however does not succeed in establishing a new major direction since it is not paralleled by an equally dominant band of pedestrian circulation that would connect to the radial circulation tissue. The transitions on the edges of solarCity towards existing housing stock (to the west and south) and to the new landscape park and riparian forest (to the east and north) are nuanced and very well considered. In this case the radial layout allows the district to either open up to or have a communicative edge with its larger context.

### ***Critique***

The following section evaluates solarCity as it is built against the ideas and ideals embodied in its inception. These are condensed in three thematic areas. Like in the case of Vauban, the discussion is open-ended as the research is still ongoing.

Urban form – the layout of the city means that the buildings generally relate to the streets only on their short ends, so that the streets actually have little interaction with building – a situation where there is a lack of street-fronts. The overall spatial configuration as well as the low building density makes this development a suburban model rather than an urban model for a sustainable community. The site and morphology of the development, being hemmed in on all sides by nature reserve or the existing urban developments mean that there would be little scope for growth and expansion of the development. Its similarity to the Garden City brings forth the well-known critiques of such a model, whereby the move to decentralize from the central city makes these developments “bedroom communities” rather than real cities. The spatial environment of solarCity recalls a village rather than an urban setting. While the planning of a car-free community is laudable, the lack of a main street in the development, where the layering of functions often create vibrancy and animation on the streets, effectively takes away the possibility of the creation of true urban public space.

Planning paradigm – unlike Vauban, where the residents already form building development co-ops before construction, solarCity is commissioned by the municipal government, so that the future residents are not the “developers” of their own units. The result is less choice and diversity in architectural expression of the housing forms, and perhaps less sense of ownership. With its strict environmental and ecological regulations and control, it is envisaged that residents would have little scope for altering their dwellings in the long term, a critique also of the Garden City model, such as in Letchworth, UK. The result is more of a model community for learning about ecological construction and mode of living – an educational showpiece - rather than a development that would allow future choice and diversity of developments.

Community – the clear boundaries of the development allow little overlap with surrounding communities. It remains to be seen if the existing communities near the new city quarter would actually make use of facilities provided in solarCity or if the development would become a self-contained community of like-minded residents.

## Conclusion

**Measuring Sustainable Development** – It would be immensely useful to be able to use measurable evidence to affect a comparison of the two developments as they are almost similar in size and scope. However, at the present, there are tools to measure individual building performance, such as Building Environmental Assessment (BEA) tools where performance of buildings are assessed against a standard, but ways of measuring sustainable urban development as a comprehensive framework are still in the process of development. Tools like Environmental Impact Assessment (EIA) are project specific and measure only the impact on ecological values of high or pristine ecological value.<sup>13</sup> Other tools such as ecological footprinting (EF) as developed by Wackernagel *et al.* measure and evaluate ecological impact on a national level.<sup>14</sup> Its limitations are also that it takes into account a set of values concerning ecological systems but lack dimensions pertaining to social and economic factors. As such, it is difficult to discuss the findings in measurable factors that are correlated, and their interactions taken into account. We believe that the developments as a whole, including the factors of architectural and urban design as well as social and community dimensions, exceed the sum of the environmental technologies, photovoltaic systems and waste disposal systems.

**Lessons in Creating New Sustainable Communities** – The studies of Vauban and solarCity Linz suggest some important factors that are strongly correlated in creating sustainable developments. Design plays a role in creating integrated environmental technology systems so that they form part of the larger inhabitable environment rather than showcases of environmental science. Good architecture and urban design creates identifiable community spaces and sense of place that are the glue to tenable sustainable communities.

Net densities of the developments are generally low, from about 0.65 plot ratio in solarCity and 1.2 plot ratio in Vauban, with about 50 to 100

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<sup>13</sup> Hyde *et al.* argue for an environmental brief that could address the exiting limitations of measurement tools.

<sup>14</sup> Mathis Wackernagel *et al.* developed the measure of the ecological footprint (EF), defined as the land area necessary to provide for a given lifestyle of a population. It is measured in hectares. It includes the amount of arable land, grazing land, fishing grounds and built-up land to support that population and lifestyle. Added to this is the amount of forest that would have been required to absorb the carbon dioxide emitted by the fossil fuels used by the population. All types of land are then converted to land of average biological productivity (ability of the land to produce biomass), based on a scaling factor.

persons per hectare respectively. The question is if such developments can have increased capacities and still retain the high quality of environment. The generous space provisions in both studies enable the developments to provide the best solutions for the widest numbers of factors. The efficiencies of the development may become less ideal with increased densities and plot ratio. For example, increasing the numbers of floors and heights of the buildings may not result in increase in area suitable for the installation of photovoltaic panels, in addition to the fact that the resulting waste accumulation may be difficult to be dealt with on site.

The scale of both development also suggests that a population of up to 5,000 (i.e. a traditional neighborhood size) may be an ideal size for population retention and “stake-holding” in building the community and subscribing to the particular lifestyles and beliefs that these developments embody, such as the progressive, “green” agenda central to Vauban. As such, these communities might be networked within regional developments as linked constellation, rather than as expanded developments.

It may be inferred that the idea that cities are more efficient with increasing densities should be replaced with the framework that integrated design solutions on an urban scale provide sustainable solutions that balance quality of life, diversity of population, public transport systems and community scale with the ecologies of site as well as the social and economic factors. Improved environmental technologies support and enhance, but not replace, the primacy of well-designed urban form in creating good, sustainable living environments and public spaces.

Vauban presents itself as a viable and real alternative to suburbanization of neighborhoods and the loss of the sense of urbanism and citizenship in residential developments. Without a preconceived model of architectural typology or urbanism, Vauban is a bold experiment in the planning and design of housing for the future, and bringing back the qualities of the city into neighborhood developments, yet at the same time seeking alternatives such as limiting but not prohibiting car-use by making such a need almost non-existent.

SolarCity on the other hand demonstrates the aestheticizing of sustainable urban design and architecture to reveal new possibilities in their expression. The development proves that sustainable development can at the same time be very attractive in both form and spatial aspects, and would surely be an inspiration to architects and urbanists. The compact urban form can be expandable via future developments of similar cities poten-

tially forming a constellation of satellite cities linked to a central city. Despite the open questions of connectivity with surrounding communities and the lack of urban quality compared with city core areas, the case studies of Vauban and solarCity allow us a glimpse of possible alternatives to urban neighborhood development, which allows flexibility for change, yet not depleting the resources for future generations to come.

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### **3 In the Quest of Sustainable Communities: A Theoretical Framework to Assess the Impact of Urban Regeneration**

*Catalina Turco*

A growing number of regeneration initiatives are being planned with sustainable principles in mind. These initiatives are usually innovative projects that exhibit the latest thinking in terms of built-form and construction technology. But how could one assess the impact of these regeneration initiatives on community sustainability? More precisely, how could one assess if a community in a regeneration area moves towards or away from sustainability? This chapter aims to answer these questions in two stages. First, it looks at community sustainability from a regeneration perspective addressing both theoretical aspects of 'community sustainability' and raising measurement questions. Second, the chapter discusses theoretical and practical issues around the selection valid dimensions for the framework of sustainable communities. It proposes an innovative approach which draws extensively on the literature anchored in the capability approach, developed by Nobel Prize economist Amartya Sen and others over the last 30 years. The final outcome of this process is a theoretical framework made of 22 components under 6 main domains. Finally, the validity of the framework is empirically tested with 122 respondents in three small regeneration areas in the UK.

#### **Introduction and Context**

A growing number of regeneration initiatives are being planned with sustainable principles in mind. These initiatives exhibit the latest thinking in terms of built-form and construction technology. The sustainability of certain physical aspects of the built environment such as density, compactness and design have been subject of extensive research (van Diepen, 2000; Williams, 2000; Williams, Burton, & Jenks, 2000). In places, these studies cast doubts on the link between built form and community sustainability,

which in itself suggests a need for further research (Barton & Kleiner, 2000; Kettle, Littlewood, & Maye-Banbury, 2004). Other studies have concentrated on the 'inputs' which make up a sustainable built environment (Brownhill, 2002; Llewelyn, 2000). But how could one assess the impact of urban regeneration on the sustainability of a community? More precisely, how could one show that a community in a regeneration area moves towards or away from sustainability?

Creating sustainable communities represents UK's government overarching goal and long-term vision for the future. It represents one of the four agreed priorities of the recent 2005 UK Sustainable Development Strategy, along with sustainable consumption and production, climate change and natural resource protection (H M Government, 2005). The former Office of the Deputy Prime Minister (ODPM) launched the Communities Plan in 2003 with the stated objective of creating '*prosperous, inclusive and sustainable communities*'.

The Plan set out a programme of action for both urban and rural areas, with a focus upon ensuring that these communities have *good quality customer-focused services, good design and deliver clean, safe, healthy and attractive environments which people can take pride in*. Criticism has been raised of the Plan because of the incongruity between 'sustainability' and the promotion of house building in the South East of the UK. Moreover, it has been challenged on issues such as community involvement and tools for delivery (Power, 2003); and its relation to planning for housing in the context of social cohesion alongside environmental protection and economic prosperity.

However, despite growing interest and increased 'investment' in 'sustainable communities', scholars and practitioners still lack the tools necessary for determining whether and how projects and policies aimed at community sustainability reach their intended goals. Among the challenges associated with 'achieving sustainable communities', two of them in particular are related to the topic of this chapter. First, defining *what makes a sustainable community* (that is to say breaking down community sustainability into components), and second, knowing *when a community has achieved sustainability or is sustainable* (namely, measuring or monitoring a community's progress to or regress from a sustainability). If the first one can be seen as a theoretical challenge, the latter could bestow some significant policy lessons and help practitioners and policy-makers at the fore-



front of the 'Communities Plan'. This study aims to address these two challenges in three Housing Market Renewal (HMR)<sup>1</sup> areas.

The 'sustainability' literature is complex and also fast developing as is demonstrated by the increasing number of studies and body of research undertaken in the last five years. Scholars at all levels struggle to categorise the different aspects of sustainability, though they are pretty much in agreement about what should be included. In fact, the majority of studies in the literature have focused either on a discussion of sustainable communities from a socio-economic perspective (Baine, Camp, & Eversley, 2005; Conway & Johnson, 2005; CURS, 1999), or from a regeneration-neighbourhood angle (Barton, Grant, & Guise, 2003; Green, Grimsley, & Stafford, 2005; Groves, Middleton, Murie, & Broughton, 2003). Few studies have brought them together, and this is what the framework discussed by this chapter mainly aims to do.

## Theoretical Clarifications

### *Defining 'Sustainable'*

A consistent definition of sustainable development and sustainability has proved to be elusive (Bell & Morse, 1999). The uncertainty over the definition has not reduced the popularity of the concept: 'sustainability' and 'sustainable development' have gone high on the political agenda especially after the *Brundtland Report*, published by the World Commission on Environment and Development (WCED), in 1987. Since then, governments across the world have launched various initiatives (among them Agenda 21 and Sustainable Communities Programmes) aimed at implementing principles of sustainable development and sustainability at national and local level.

However, initial reaction in the academic circles was largely sceptical. Sustainable development was seen as simply a 'veiled declaration for eco-

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<sup>1</sup> The Housing Market Renewal initiative or Pathfinder programme was launched by the Government in April 2002, when nine area partnerships were invited to establish pathfinder strategies to tackle low demand and housing abandonment in parts of the Midlands and Northern England. The initiative has been seen as a holistic approach to the economy, environment and housing at a sub-regional level, demanding a significant change in the level of co-ordination of urban policy and expenditure programs, both within the target areas and at the wider regional level (Cole & Nevin, 2004).

conomic growth', with little concern for environmental protection and social cohesion (Lafferty & Coenen, 2001). More recently this reaction has started to change, in particular through the involvement of the voluntary sector that has helped to build trust between people and institutions and made the whole process more transparent. It is largely acknowledged that over time the whole process has developed people's environmental awareness and helped them to see how such issues are related to broader social issues (Church & Young, 2001). Yet some academics still point to the fact that there is a certain degree of hostility to the concept of sustainable development and that it needs to be further understood and accepted. People still consider it as jargon and there is as yet no blueprint of just how 'sustainability' and 'sustainable development' would translate into practice (Marvin & Guy, 1997; Rydin, Holman, Hands, & Sommer, 2003).

**Box 3.1.** Two Approaches to Defining 'Sustainable'

**ECOCENTRIC interpretation**

- ENVIRONMENTAL (resources version)

Focusing on the consumption of resources, this approach seeks to avoid lasting adverse impact on the world's stock of natural resources (*Brundtland Report: Our Common Future*, 1987; Meadows, *Limits to Growth*, 1972).

- ECOLOGICAL

The ecological approach emphasises the characteristics of living organisms in communities, such as the ability to self-regenerate, self-sustain and the ability to respond to changes (Ramwell and Saltburn, *Trick or Treat, City Challenge and the regeneration of Hulme*, 1998; Copus and Crabtree, *Indicators of socio-economic sustainability*, 1996; Page, *Developing communities*, 1994).

**ANTROPOCENTRIC interpretation**

- ENDURANCE

In this approach, sustainability is achieved by undertaking activities which produce lasting benefits – like training – or which deal with long term problems (Aldbourne Associates, *Planning sustainable communities*, 1999; Thake, *Staying the course, the role and the structure of community regeneration organisation*, 1995).

- DEMAND BASED

Undertaking activities that encourage people to live in communities, equating the definition with popularity and/or quality of life (Evans and Fordhan, *Regeneration that lasts*, 2000; Smith and Patterson, 1999).

- ENVIRONMENTAL (social version)

This approach seeks to optimise both environmental and human resources, with an emphasis on democratic and participative outcomes (DETR, *A better quality of life – A strategy for sustainable development in the UK*, 1999; Local Agenda 21, *Indicators for Local Agenda 21 – A summary*, 1996).

Adapted from Long, 2000.

A review of relevant literature has revealed two main interpretations of 'sustainability'. One *ecocentric*, which puts global ecology first and limits economic and population growth in the interest of sustaining and enhancing the 'nature', and one *anthropocentric*, which puts human beings first (Barton, 2000). Box 3.1 illustrates these two main directions together with other sub-approaches to defining 'sustainable' and 'sustainability'. Moreover, there is frequent reference to two different visions of sustainability depending mainly on the costs incurred in attaining them (Bell & Morse, 1999): *strong* sustainability and *weak* sustainability. The *strong* vision of

sustainability can be associated with the *ecocentric* interpretation, while the *weak* vision can be related to the *anthropocentric* approach.

### **Defining 'Sustainable Communities'**

The definition of 'community' usually encompasses two main connotations: one of *shared interests* such as personal affiliations and cultural heritage, and one of *locality* or *place*, which is the residential area where people live. First, 'community' is a *social* term. It means a network of people with common interests and expectations of mutual recognition, support and friendship. These social networks, based on chosen connections rather than residential proximity have been termed '*communities of interest or identity*' (Willmot, 1987). Second, the locality or local residential area may provide the focus for a number of overlapping and interacting interest communities (such as children in school, baby-sitting circles, local shops, pubs, allotments, church) which together with casual public realm meetings make for much more social interaction than the sum of the parts, thus '*place communities*' (Barton, 2000; Gilchrist, 2002).

Mazmanian and Kraft's overview of the evolution of modern environmental policy culminates with the 'epoch' of sustainable communities. They argue that 'linking sustainability concepts and concepts of community has particular advantages, since communities represent the social and physical expression of interdependencies' (Mazmanian & Kraft, 1999). However, sceptics argue that no-one yet knows what sustainable communities are like and that there are few places or whole communities that have incorporated sustainability across their entire social, economic process and physical fabric (Barton & Kleiner, 2000; Beyond Green & Housing Corporation, 2004). In addition, Church and Young note that the 'sustainable communities' phrase is increasingly employed by a various range of initiatives from 'eco-villages in rural Wales to those based around tower blocks in depressed urban areas'. They also point to the difficulty of evaluating what is and what is not a sustainable community, as some tangible components of sustainable communities are easy to measure (such as 'people completing training schemes'), while other more intangible components (such as community pride) are much harder to assess (Church & Young, 2001).

'Sustainable communities' have been defined as an aggregate of characteristics including among others economic security and growth, environmental quality and integrity, social cohesion and quality of life, empowerment and governance. Box 3.2 illustrates some examples. The complex

interdependencies between economic, social and environmental phenomena, and the need to balance these over *time*, have been the focus of particular attention (AtKisson, 1999; Lafferty, 2001)). Balancing requires integrative and strategic policy responses. The literature on governance-related aspects shows how the emphasis has shifted from top-down control to networking and partnerships between different actors (Keen, Mahanty, & Sauvage, 2006; Rydin, Holman, Hands, & Sommer, 2003).

**Box 3.2.** Definitions of Sustainable Communities

|   |  |
|---|--|
| (Long, 2000)                            | 'a grouping of up to several thousand households, whose occupants share common experiences and bonds derived from living in the same locality'   |
| (Gilchrist, 2002)                       | Sustainable communities are heterogeneous and therefore adaptable, formally and informally organized and require reciprocal and reliable relationships that are based on trust, equality and the honoring of diversity.  |
| (Green, Grimsley, & Stafford, 2005)     | 'We think of the sustainability of a community in terms of what happens to the welfare of residents over time. Specifically, sustainability obtains when community welfare does not diminish over time.'   |
| (Lafferty, 2001)                        | Lafferty sees sustainable communities as the implementation of sustainable development principles at the local level i.e. Agenda 21.   |
| (Putman, 1996)                          | Putman sees building sustainable communities as building social capital which is mainly about building trust.  |
| UK Government<br>(H M Government, 2005) | 'Sustainable communities are places where people want to live and work, now and in the future. They meet the diverse needs of existing and future residents, are sensitive to their environment, and contribute to a high quality of life. They are safe and inclusive, well planned, built and run, and offer equality of opportunity and good services for all.' |

***Can One Actually Measure 'Community Sustainability'?***

Measuring sustainability is a controversial issue (Bell & Morse, 1999). Some argue that the whole sustainability issue is a moving target and that developing measures at any one point in time is not worth the effort (Hempel, 1999). Others say that it is important to monitor progress, as people need a reality check to ensure that incremental steps are moving in desired directions (Hemphill, McGreal, & Berry, 2002; Innes & Booher, 2000). Moreover many authors use 'ad-hoc' sustainable community check-lists without clear theoretical and methodological foundations (Barton, 2000; Barton, Grant, & Guise, 2003; Bell & Morse, 2003; Brownhill, 2002). Given the disparity of views it should not be surprising that 'there is no textbook which gives a methodology that is generally accepted and applicable across regions and sectors' (Hardi et al, 1997 quoted in (Bell & Morse, 2003)). Moreover, Innes and Booher find that existing methods are seldom influential – most typically, influential players such as policy makers or politicians do not read the findings and much less act on what they found out from them (Innes & Booher, 2000).

Although the analysis of the literature reveals the existence of some broad approaches (see *Box 3.3*), perhaps the most popular approach has been the employment of indicators and indexes. Moreover, some indicators are specially made for certain community and organisations (AtKisson, 1999; Roberts, 2000) while others are universally applied across a number of areas, projects or organisations in a comparative exercise (European Communities, 2001; Expert Group on the Urban Environment, 2000).

**Box 3.3.** Examples of Approaches to Measuring Sustainability

| Approach   | Explanation  | Limitations/ Criticism  | Why not appropriate for this research   |
|--|--|---|---|
| <i>Ecological footprint (EF)</i> , based on the notion of <i>carrying capacity</i> | A spatial unit (e.g. urban area, country) can be described in relation to its impact in terms of the land area required to support it. | The main criticism of ecological footprint is that it ignores many other factors at the heart of sustainability and it is too simplistic. For example, the model is static, whereas both nature and the economy are dynamic systems. The ecological footprint therefore cannot directly take into account such things as technological change or the adaptability of social systems.  | It cannot be employed to account for social aspects such as, for example, sense of community or community mix or broader economic factors. Moreover, this approach takes an eco-centric environmental (resources version) interpretation of sustainability which is not endorsed by this research   |
| <i>Material intensity per unit of service (MIPS)</i>                               | The mass of material input per total units of service delivered by the good over its entire lifespan.                                  | The most common criticism towards MIPS that MIPS does not take into account ecotoxicity of materials (i.e non-toxic materials) and even these can on the environment. The current climate issue and CO <sub>2</sub> -emissions show that also vast amounts of non-toxic materials may contribute to environmental problems. Critiques have also noted that extensive material flows occur in natural processes. However, the pace on which humans transfer materials is so fast that the environment cannot keep up with it and reproduce itself. | This approach takes an eco-centric environmental (resources version) interpretation of sustainability which is not endorsed by this research.   |
| (Solar) <i>Emergy</i> approach   | Converting inputs/flows into a common energy equivalent (usually solar energy)   | The <i>emergy</i> approach has encountered a lot of resistance and criticism, particularly from economists, physicists and engineers. Some critics have focused on detailed practical aspects of the approach, while others have taken issue with specific parts of the theory and claims.  | tba   |
| <i>Cost-benefit analysis (CBA)</i>   | Comparison of financial values of the costs of achieving sustainability with the benefits  | It seems most of the criticism focuses on three dissenting themes: cost-benefit analysis does not provide unbiased information; it is inherently anti-environmental; and efforts to use monetary cost-benefit analysis for environmental and safety regulations erode the self-evident values upon which our society is based.  | Cost benefit analysis draws on traditional economics based on income, growth, productivity etc and does little to consider individual choices and needs. Sen's work challenges traditional economics on this very ground and introduces a 'sociological turn' in contemporary mainstream economics. |
| <i>Indicators and indexes</i>  | 'Signs and signals which should be monitored in order to predict a good future'  | The main criticism regarding indicators is that they are mainly based on data availability and as concerning indexes that they loose the 'richness' of the sustainability concept by merging different aspects in one number.   | Lists of indicators seem to have a arbitrary composition, usually from a top-down or purely theoretical perspective; and their development is not transparently explained. Indexes miss out 'hidden' aspects of sustainability by merging everything in one number.                                 |

## Learning From Building Lists of Capabilities

### *What is the Capabilities Approach?*

The capabilities approach focuses on ‘valuable’ things that people effectively are able *to do* and *be*, rather than income, expenditure, growth or ‘primary goods’, which have been central to approaches traditionally employed in economics and philosophy.

Capability is [thus] a kind of freedom: the substantive freedom to achieve alternative functioning combinations’ ... functionings being the ‘various things a person may value doing or being, such as being adequately nourished, being free from avoidable disease (Sen, 1999:48).

Thus, according to Vizard and Burchardt

Capabilities are substantive human freedoms or real opportunities (such as the ability to avoid premature mortality, to be adequately nourished, to have access to adequate health, social services and education, to participate in and influence public life, and to enjoy self-respect) that people value and have reasons to value. The capability approach is an analytical framework for examining the achievement (and lack of achievement) of basic human freedoms of this type. (Vizard & Burchardt, 2007:16)

Over the last thirty years, the capabilities approach has followed two main developments in its application. First, its ‘*theoretical*’ development has concentrated on justifying the approach as representing a consistent and robust *theory of social justice that overcomes the limitations of other theoretical approaches, such as those that focus on negative freedoms, utility or primary goods*. Second, its ‘*evaluative*’ or ‘*operational*’ development has focussed on *practical ways* of assessing the achievement or non-achievement of key capabilities by individuals, groups and nations.

It has so far been used to assess poverty<sup>2</sup>, inequality<sup>3</sup>, quality of life<sup>4</sup> and human development<sup>5</sup> and has increasingly become an alternative ‘point of departure’ for multidimensional issues.

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<sup>2</sup> See for example in (Alkire, forthcoming)

<sup>3</sup> In their work for the recently published Equalities Review, Vizard and Burchard draws on the capabilities approach for the conceptualisation and measurement of inequality in Britain (Vizard & Burchardt, 2007)

<sup>4</sup> Robeyns discusses methods in *selecting capabilities for quality of life measurement* that should be tailored to three categories of quality of life measurements: small scale projects, large-scale empirical assessments and large-scale policy design (Robeyns, 2005b)

### ***Innovation and Critical Reflections***

The framework discussed by this paper draws mainly on the second development of the capabilities approach. More specifically, it draws on some methodological aspects involved in its operationalisation, namely the selection of relevant dimensions of multidimensional concepts such as human development, poverty, inequality, quality of life and well-being. It does not aim to operationalise the capability approach in the context of sustainable communities nor contribute to the literature and theory of the capability approach. However, it takes something important from the first line of analysis too, namely the lesson implied by the following sentence: 'If an idea has an essential ambiguity, a precise formulation of that idea must try to capture that ambiguity rather than lose it' (Sen, 1992). In fact, community sustainability, like all above mentioned concepts, is a broad and vague concept and trying to be over-precise may be at odds with the nature of these ideas.

This approach should not be seen as a comprehensive method, let alone as a 'recipe' that can decipher 'community sustainability'. The 'list', discussed later in this paper, may give the impression to answer every question. This is not the case. The list (framework) of sustainable communities should be seen as an open framework, as a toolbox, which does not claim to be exhaustive. One may be critical about the choice of some dimensions over others or the way they are categorised. The framework is primarily about the *process* of choosing dimensions and secondarily it is built on sensitivity towards contextual dimensions. This also comes with the risk of having to deal with too much information and therefore (intentionally) miss some dimensions in order to have a 'tailored to the scope of the research' and manageable list.

We believe that the 'added value' of this approach can be summarised as follows:

- Its legitimacy comes from the direct involvement of people/ communities and the 'list' of sustainable communities is derived through open discussion and involvement rather than concealed methods;;
- It is interdisciplinary and therefore opens avenues for both standard quantitative and qualitative analysis which may reveal a new theoretical space in the study of sustainability.

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<sup>5</sup> The Human Development Index (HDI) has been used by the United Nations since 1990 as a measure of human development. The index consists of three aggregate indicators: life expectancy at birth, adult literacy rate and mean years of schooling, and income as measured by real gross domestic product per capita.

**'List' vs. 'NO List' of Capabilities**

One of the main debates that runs throughout the literature is whether *to* select 'a list' of capabilities in order to 'operationalise' the capabilities framework. Alkire caricatures this debate by calling it 'having a list' vs. 'making lists for every occasion' (Alkire, forthcoming). And one could argue that a 'one-size-fits-all' list of dimensions of poverty, inequality, human development or community sustainability that could be shared internationally looks as a very attractive proposal. While scholars, among whom the most notorious is Martha Nussbaum, have argued in support of a final or fixed list<sup>6</sup>, Sen has been reluctant to endorse such a list for two main reasons. First, he believes that the list shouldn't be seen as a matter of 'pure theory' or as a technocratic process but embedded in a process of democratic deliberation and public consultation and therefore be open to challenge and revision. He goes further and argues that the problem does not lay with choosing dimensions that can be on a list but with building *a grand mausoleum to one fixed and final list of capabilities*<sup>7</sup>...*chosen by theorists without any general discussion or public reasoning because pure theory cannot 'freeze' a list of capabilities for all societies for all time to come, irrespective of what the citizens come to understand and value.* Second, for Sen, a list of capabilities *must* be context dependent and therefore, different lists may be suitable for different purposes and in different contexts. In sum, he is not against choosing context-dependent key domains and dimensions in a democratic way, but against a 'fixed' and 'inflexible' list which claims to be applicable in any situation.

In this context, the two following questions need to be addressed:

- *How to choose domains?*, in other words *what are legitimate ways of defining domains?*; and
- *How to choose relevant components within each domain?*

**How to Select Domains and Components?**

Alkire (forthcoming) notes that there are situations when researchers have to 'operationalise' Sen's approach and therefore need to choose dimensions. However, she believes that this is not a bad thing, but the real problem is that the researchers do not make explicit the way these dimensions

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<sup>6</sup> Nussbaum argues that there should be one universal list of human capabilities which can be translated in more detailed and specific lists so as to suit the context. This approach comes along to critiques of Sen's *non-prescriptive* approach which is highly individualistic and therefore may encourage paternalism and inappropriate policies (Nussbaum, 2000).

<sup>7</sup> Sen, 2004: 80.



have been chosen so that an 'outsider' cannot probe, trust or question the chosen dimensions. Robeyns shares her opinion and suggests that just describing *how and why* dimensions are chosen can be of great help, even if this is to be done in 'one short paragraph of a paper' (Robeyns, 2005).

In order to solve this methodological problem, Alkire identifies five methods employed alone or in combination by researchers when selecting domains/ dimensions. They are as follows:

1. Use of *existing data* – when dimensions are selected because of convenience or a convention to be authoritative, or because these are the only data available;
2. Use of *normative assumptions* or *informed guesses of the researcher* – when dimensions are based on a theory or on explicit or implicit assumptions about what people should (or do) value;
3. Use of an *existing list that was generated by consensus* – when dimensions are based on a list/ lists that have achieved a degree of legitimacy due to public consensus;
4. Use of *on-going deliberative participatory process* – when dimensions are drawing from ongoing purposive participatory exercises; and
5. Use of *empirical studies of people's values and/ or behaviours* – when dimensions are based on expert analysis of people's values.

In conclusion, the researcher should provide the reader with an *explicit documentation of selection procedures* – and *if the researchers share their assumptions hence public dialogue and scrutiny...then the approach may be both efficient and constructive*. Drawing on this literature, the list presented in this paper is based on a combination of three methods:

- First, domains and dimensions are collected from *six lists* that have achieved a degree of legitimacy either from intensive public consultation or academic debate;
- Second, an *ideal list of dimensions* is developed based on author's *informed guesses* and applying a three step filtering process
- Third, a *pragmatic list of dimensions* is introduced which is the result of the *ideal* list being discussed, examined and amended following in-depth interviews with 24 senior level key actors involved in the 'creation and delivery of sustainable communities', called 'public experts'.

## Developing a List of 'Sustainable Community' Dimensions

### ***An IDEAL List: Selecting Core Domains of Community Sustainability***

The process of developing a list of community sustainability starts by engaging with *all* relevant literature and results in a draft list for discussion. Robeyns notes that when the capability approach is applied to particular research questions, one might prefer lists that are derived from, embedded in, and engage with the existing literature in that field (Robeyns, 2003). Six different lists looking at community sustainability and neighbourhood sustainability have been selected. They have been selected on the basis of their relevance to either: the policy and government and the academic literature. Moreover, they represent the most up to date and 'publicly accepted' lists, being the outcome of intensive consultation exercises (in the case of policy or government field) or high level thinking (in the case of academic field). The six lists are:

1. The 'Securing the Future' UK sustainable development list relevant to sustainable communities (H M Government, 2005)<sup>8</sup>;
2. The 'Egan components' of sustainable communities (ODPM, 2004)<sup>9</sup>;
3. The 'Housing Corporation toolkit' of indicators of sustainable communities (Long & Hutchins, 2003)<sup>10</sup>;
4. The 'four capitals' of community and neighbourhood sustainability (Green, Grimsley, & Stafford, 2005)<sup>11</sup> drawing on Meadow's pyramidal representation of sustainable development (Meadows, 1998)<sup>12</sup>;

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<sup>8</sup> In March 2005, the Government published its new sustainable development strategy in *Securing the Future*. The strategy lays down a set of 39 indicators, under 9 main domains: society; employment and poverty; education; health; mobility and access; social justice/environmental equality; housing; wellbeing; and international. (H M Government, 2005)

<sup>9</sup> *The Egan Review: Skills for Sustainable Communities*, produced 46 sustainable communities indicators, organised in seven key domains: social and cultural, governance, environmental, housing and the built environment, transport and connectivity, economy and services (ODPM, 2004)

<sup>10</sup> *A Toolkit of Indicators of Sustainable Communities* is targeted at Registered Social Landlords, Local Authorities and Pathfinders<sup>10</sup>. It consists of 49 indicators structured under 10 domains: current demand; long-term demand; reputation; crime and anti-social behaviour; social exclusion; accessibility; quality of the environment; housing quality, design and layout; community cohesion; and the mix of the community (Long & Hutchins, 2003)

<sup>11</sup> Green *et al* discuss four assets or capitals (social, human, environmental and fixed) which are key to neighbourhood sustainability. Each asset/ capital is defined by a number of elements, 18 in total as follows: social capital (contact, trust, participation); human capital (employment, skills, health); fixed capital (housing, workplaces, facilities, shops, roads);

5. A 'sustainability checklist of healthy neighbourhoods' (Barton, Grant, & Guise, 2003)<sup>13</sup>;
6. The 'Sustainable Seattle' framework of city sustainability (AtKisson, 1999)<sup>14</sup>.

These lists bring together forty five domains, some of them overlapping. The domains have been further categorised under eleven main headings—economy, society, environment, housing, built environment, transport, accessibility, education, health, governance and other. The eleven headings have been further amalgamated in five core domains:

1. Economy
2. Society
3. Natural Environment
4. Built Environment
5. Governance

The first three components (*Economy*, *Society* and *Natural Environment*) represent the three basic elements of sustainability, common to all frameworks. For the purpose of this research they will refer to local aspects of community sustainability. The fourth component (*Built Environment*) seeks to incorporate principles of 'sustainable regeneration' and will look at things like design, physical aspects of housing and transport & accessibility. As shown in a review of relevant literature, the majority of studies have focused either on a discussion of sustainable communities from a socio-economic perspective, or from a regeneration-neighbourhood angle. No study has actually tried to bring them together and this component aims to fill this gap. The fifth component (*Governance*) considers the time dimension of community sustainability. In fact, a way in which this component could be assessed is to consider whether certain governance mecha-

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environmental capital (parks, streetscape, open space); and finally well-being (satisfaction with neighbourhood and change in satisfaction with neighbourhood, satisfaction with home, how likely to stay in neighbourhood).

<sup>12</sup> Meadow's representation of sustainable development draws on the 'Daly Triangle' which relates natural wealth to ultimate human purpose through technology, economy, politics, and ethics as a simple integrating process.

<sup>13</sup> Barton et al developed 'a desktop manual for planners, designers, developers and community groups' in order to design *healthy, sustainable and vital neighbourhoods*. The guide is endorsed by the UK Sustainable Development Commission.

<sup>14</sup>Of numerous community sustainable development indicators (SDIs) the most famous system is the one developed by *Sustainable Seattle*. It was instituted as a program in 1990, principally as a means for engaging in 'visioning' and participatory community development. Its outcome was a list of 40 indicators organised under five main headings assessing city sustainability.

nisms, usually associated with the ‘maintenance’ of a sustainable community over time, are in place. The existence of partnerships, community involvement and management arrangements have proved to be examples of such governance mechanisms (see for example (Kettle, Littlewood, & Maye-Banbury, 2004)).

***An IDEAL List: Selecting ‘Spot-Light’ Dimensions Under Each Core Domain***

Once the core domains of community sustainability have been selected, the following question is asked: What are the relevant dimensions under each core domain that one could consider in order to assess the impact of *regeneration* at *local* level on *community sustainability*? Preliminary research identified 176 dimensions that have been established in different studies. We apply a three filters process and reduced their number to 27 organised in five core domains. First an *overlapping* or *similarity* filter is applied which clarifies whether *indicators are overlapping or similar in the sense that they provide the same or similar information*. For example, dimensions such as ‘workless households’, or ‘economically inactive’ contains very similar information which we argue could be reflected by the ‘employment’ dimension; similarly for ‘availability of employment’ and ‘access to jobs’. Second, the *local/locality* filter answers whether *the dimension is perceptible and relevant at local level*. The local filter is the result of both the anthropocentric definition of sustainability and the adopted definition of place community. As a result dimensions such as ‘local employment’, ‘local business activity’ and ‘local public transport’ have been identified, while others such as ‘air quality’, ‘wild salmon’ and ‘household formation’ have been excluded from the list. Third, the *regeneration* filter excludes dimensions that are not possible to be directly influenced by regeneration – that is to say by the type of regeneration this research looks at namely large scale refurbishment. This filter results from the need to assess the relation between regeneration and community and the impact of specific regeneration initiatives on community sustainability. Thus, measures such as ‘mix’ and ‘community satisfaction with local area’ and ‘public transport’ have been selected. Others such as ‘noise pollution’ and ‘air pollution’, ‘road accidents’ have been excluded. However some of these excluded dimensions or components may be relevant to other regeneration contexts – for example, ‘road accidents’ could be influenced by regeneration by applying ‘secure by design’ principles in re-designing the street layout; in our case, this is not a viable component because we look at regeneration in a refurbishment context and therefore no major works to the roads has been carried out.

### ***A PRAGMATIC List: Taking the IDEAL List to Public Consultation***

The *ideal* list has been exposed and discussed with 24 senior level key actors, called ‘public experts’, involved in the strategy, research and delivery of sustainable communities in 7 out of the 9 HMR areas. This has been underpinned by a detailed review of HMR ‘in-house’ documents and existing monitoring systems in order to better understand the HMR context. In addition, the framework has been presented at two conferences in 2007: Housing Studies Association and European Housing Network Research and therefore exposed to further academic scrutiny. The result of this process is a *pragmatic* list of sustainable communities which includes both alterations and additions to the *ideal* list. Discussions, questioning and debate with the 24 ‘public experts’ has started with a face-to-face detailed explanation of what the *ideal* list is made of and a full description of its development process. The result of this stage has been that some new domains and dimensions, initially excluded by the application of the three filters from the *ideal* list, have come up again—*education* and two new components (*housing affordability* and *partnership arrangements*).

In conclusion, the theoretical and conceptual framework for breaking down sustainable communities as described by this paper and illustrated by the *pragmatic* list consists of six core domains and twenty-eight components.

**Table 3.1.** A Pragmatic List of Domains and Dimensions of Community Sustainability

| <i>Local economy &amp; jobs</i>   | <i>Local community</i>   | <i>Local environment &amp; natural resources</i>   | <i>Local housing &amp; area conditions</i>   | <i>Local services &amp; facilities</i>  | <i>Local governance</i>  |
|---|--|--|--|---|--|
| [Employment]<br>1. Local jobs<br>2. Access to jobs<br>3. Local business activity<br>4. Local investment<br>5. Skills/ Training<br>6. Housing affordability<br>7. House prices | [Community spirit]<br>8. Sense of community<br>[Crime/ safety]<br>9. Feeling safe<br>10. Less crime & ASB<br>[Community mix]<br>11. Who lives there<br>[Demography]<br>12. People moving out<br>13. People moving in | [Energy use]<br>14. Able to save energy<br>[Water use]<br>15. Able to save water<br>[Waste & recycling]<br>16. Able to recycle waste | [Housing conditions]<br>17. Housing and area appearance<br>18. Housing state of repair<br>19. Satisfaction with own home<br>[Open/ green space]<br>20. Quality of green open space<br>21. Access to green open space | [Schools]<br>22. Access to local primary school<br>[GP/ local clinic]<br>23. Access to local GP/ local clinic<br>24. Facilities & services (incl. access)<br>25. Public transport | 26. Partnerships<br>[Community participation (incl. decision-making & activity & involvement)]<br>27. Community involvement/ participation/ decision-making<br>28. Satisfaction with services provided by the LA |

In order to make consultation with members of the public easier, we re-named some domains as follows:

1. *Local economy & jobs* includes all components of the previous *Economy* domain:
2. *Society* is renamed *local community* in order to reflect the place community concept which is advocated in this paper and avoid broader and

more abstract interpretations of the concept. It consists of and draws from all the six components of *society* as follows:

3. *Natural environment* has been re-named *local natural resources* and has three main components: *energy*, *water* and *waste recycling*. Two of its components, *local environmental quality* and *open/green space*, have been amalgamated and shifted under *local build environment and housing* and reflected in *quality of green open space* and *access to green open space*.
4. *Build environment* has been renamed *local housing and built environment* and kept *housing condition*, reflected in *housing and area conditions* and *satisfaction with own home*, *housing state of repair* and *open / green space*, illustrated by *quality of* and *access to open green space*. It has also lost facilities and the sub-domain *transport and access* which have been moved to *facilities and services*.
5. The sub-domain *transport and access* and domain *education and health* have been combined in a new domain called *local services and facilities* which consists of four main components: access to primary local school and GP/ health clinic, facilities and services and public transport.
6. *Governance* has been renamed *local governance* and consists of three components: *partnerships* (which endeavour to 'look after' the good running of any community), *community participation* (which seeks to involve the local community in decision making and community activity) and satisfaction with *services provided by the local authority* (that reflects mechanisms of maintenance).

This *pragmatic* list has been tested with 122 residents living in 3 HMR areas.

## Testing the PRAGMATIC List in Three Areas

### ***A Survey of Local Residents***

The final stage in the development of the list addresses one of the most important methodological points made in the capability approach literature. Specifically, is what people directly involved in the regeneration come to *understand* and *value* as being the important elements of sustainable communities?

In order to answer this question and test the theoretical model, 122 people were surveyed in three case studies areas in the UK: Birkenhead in

Merseyside; North Benwell in Newcastle upon Tyne; and Salford in Greater Manchester. All three areas undergone regeneration for at least five years and their regeneration was completed or very near completion at the time of the survey. They were considered by the UK government and regeneration officials as '*places that aim to create sustainable communities*' (ODPM, 2005a). Moreover, the areas were very small, with between 350 and 700 households, predominantly tightly built terraced housing, mainly focusing on refurbishment of existing stock and with less than 20% demolition.

Each area was surveyed by means of a quota sample. The target sample size was 50 respondents per area which was conditioned by the available research resources. We used a snowballing method for contacting respondents in order to create a purposive sample of residents that reflected local population characteristics. Some respondents were recruited via local contact groups and advice organisations, while others through direct personal contact at local access points such as schools, cafés and shops, doctor's surgeries, community centres and Post Offices. When our sample contained enough respondents with particular characteristics, we then recruited to match other characteristics. One potential drawback of this purposive sample is that the sample may be self-selecting and only respondents taking an active part in their community were included while 'difficult to reach' and passive respondents were excluded. In practice, we found that a significant proportion of the interviewed respondents were not involved at all in their communities and knew little about the 'regeneration propaganda' in their area.

Although samples were purposively constructed to represent population profiles in the three areas no generalisation for the whole of population can be made. Quotas were deducted mainly from recent data released by local authorities in each area and only a minor part relied on 2001 Census data. Quotas were based on the following six demographic factors essential for neighbourhood sustainability: housing tenure (homeownership/social renting/private renting); economic activity (economically active/ inactive); ethnic affiliation (white/ non-white); household composition (children/ no children); and gender (male/ female); age (four age bands) (Cameron & Field, 2000; Nevin, Lee, & Phillimore, 2001). There is an increasing body of academic literature on the different ways in which women and men experience regeneration (Brownill, 2000; Gosling, 2008; Warr, 2005). Research on deprived neighbourhoods also shows that different age groups experience regeneration differently (Frank, 2006; Matthews, 2003; Silverman, Lupton, & Fenton, 2006). Moreover, due to exclusionary regenera-

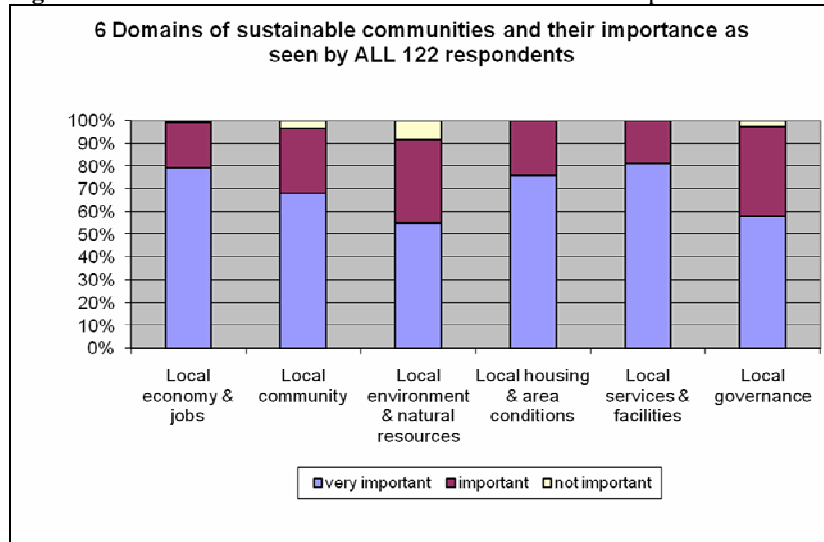
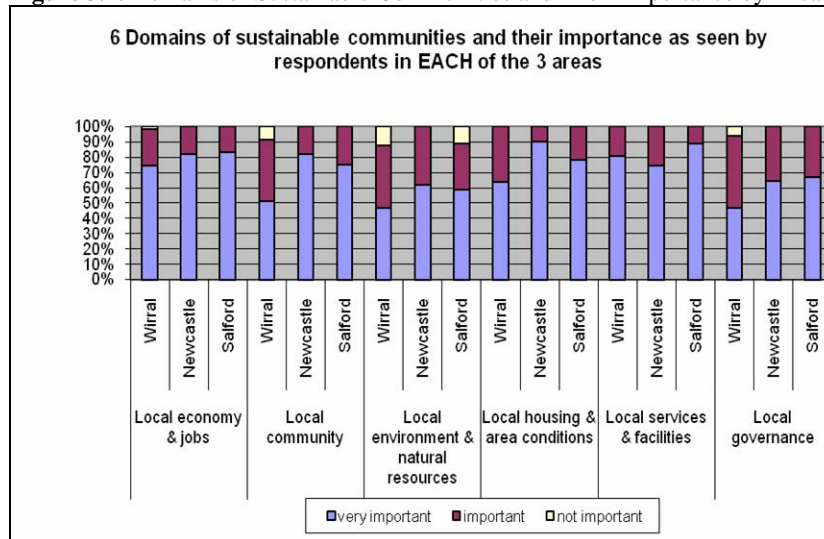
tion practice, some studies report the negative effect of urban regeneration on elderly people due to displacing established social networks and increasing likelihood of depression in comparison with other age groups (Curtis, Cave, & Coutts, 2002; Whitley & Prince, 2005).

The questionnaire was designed into two main parts and discussed during a face-to-face interview. Respondents' personal views were asked throughout the questionnaire and when they were asked to rate things in terms of importance, they were asked to do so in terms of *importance of them*. The first part asked detailed questions on each domain and component of sustainable communities. Alongside 'ticking' boxes, respondents were encouraged to express *their* opinion on each topic and therefore in most of the cases their views were explicitly illustrated. The findings from the first part of the interview will be used to mark on a gradient the three communities' progress towards sustainability and are not examined by this paper. They will be discussed in a subsequent paper.

The second part of the questionnaire/ interview, which will be further examined in the next section, asked respondents to rate each domain and component of the *pragmatic* list, in terms of their *importance to them*, as *very important*, *important* or *not important*. Therefore by the time respondents had to rate importance in the second part of the questionnaire they were well familiarised with their meaning (because of detailed discussion during the first part of the questionnaire) and more likely to make an 'informed' choice. Respondents were also asked to say if they felt anything is missing from our list. The second part of the questionnaire aimed to test the validity of the framework in two ways:

- by consulting local residents on our choice of domains and dimensions; and
- by collecting a multitude of individual views regarding our domains and dimensions and observe if despite the fact that different views were expressed, people/ individuals generally valued similar things in terms of community sustainability.



**Figure 3.1.** Domains of Sustainable Communities and Their Importance**Figure 3.2.** Domains of Sustainable Communities and Their Importance by Area

### What People Value

The survey of 122 respondents in three different HMR areas confirmed that domains and components of sustainable communities on the *prag-*

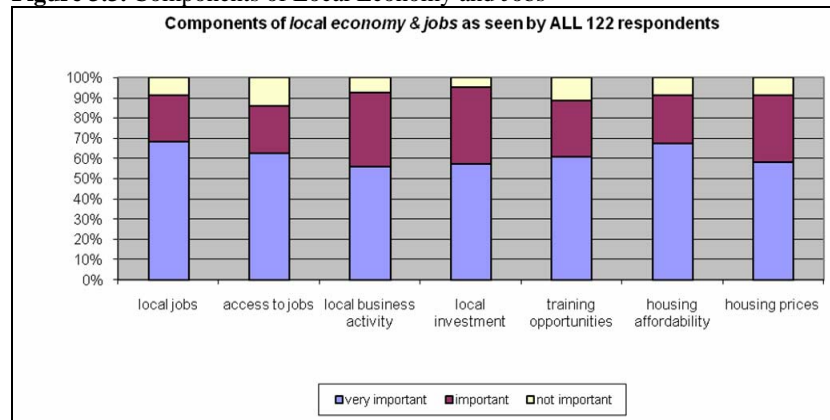
*matic* list are what people understand and value as being important for the sustainability of their community. Overall there were very few people who rated as *not important* a domain or component and these were mainly under *local natural resources*, *local community* and *local governance*. All respondents rated *local economy and jobs*, *local housing and built environment* and *local services and facilities* as important and very important, none rating these as not important. *Local natural resources* was the domain with the relatively highest percentage (8.2%) of people reporting it as not important, followed by *local community* and *local governance*, but the percentages are very small (3.3% and 2.5% respectively).

The majority of respondents always rated all domains as very important, with the lowest percentage reported for *local natural resources* (55%) and the highest for *local services and facilities* (81%). However, people in the Newcastle area have all rated *local natural resources* as important and very important.

### **Components of Local economy and jobs**

The least valued components of *local economy and jobs* were *access to job* and *training opportunities*, both having the highest percentages of people rating them as not important (14% and 11.5% respectively). However, overall the components were considered as important and very important by the majority of respondents.

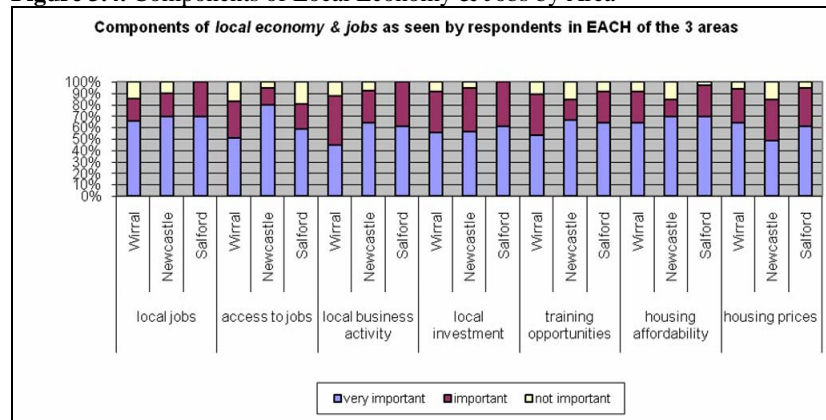
**Figure 3.3.** Components of Local Economy and Jobs



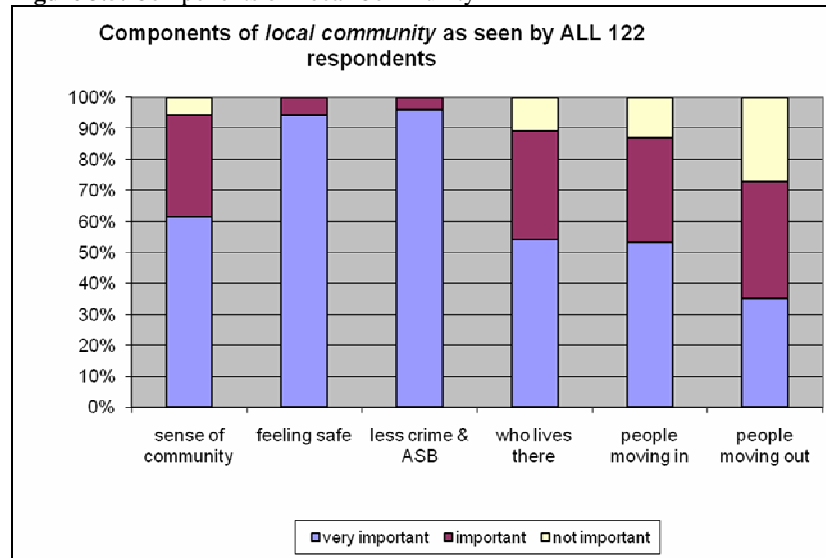
Within each regeneration area, it is in Wirral and Salford that *access to jobs* was rated the least, with almost 20% of respondents rating it as not

important. *Training opportunities* was rated the least in Newcastle. The most 'valued' component is *housing prices* for Wirral, *access to jobs* for Newcastle and *local jobs* for Salford. The least 'valued' component is *local jobs* for Wirral, *training opportunities* for Newcastle and *access to jobs* for Salford. Interestingly, *access to jobs* is the most 'valued' in Newcastle and the least 'valued' in Salford; same for the *local jobs* component which is most 'valued' in Salford and least 'valued' in Wirral.

**Figure 3.4.** Components of Local Economy & Jobs by Area



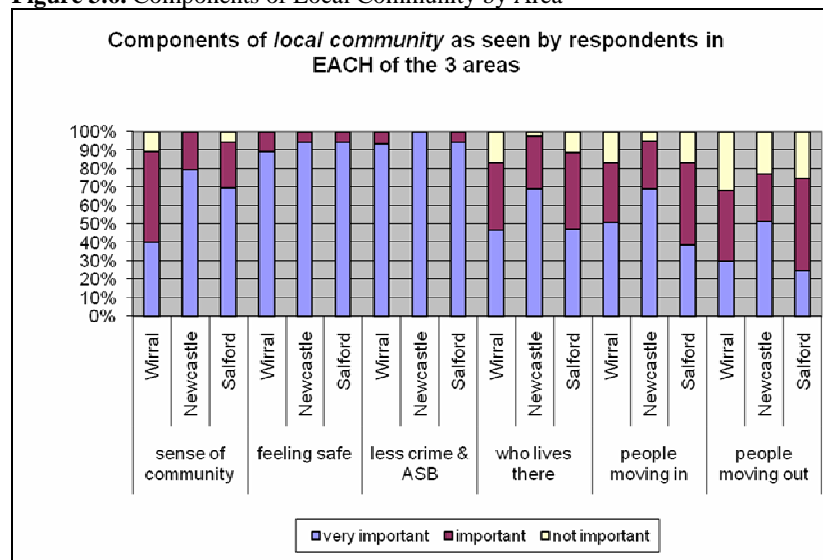
**Figure 3.5.** Components of Local Community



### Components of Local community

*People moving out* is the least valued component of the *local community* domain, followed by *people moving in* and *who lives there*. This is the case overall as well as within each of the three areas considered separately, though people in Newcastle were less likely to say that *people moving in* and *who lives there* were not important than people in Salford and Wirral. Again, the majority of people overall, and within each area, rated all components as either important or very important.

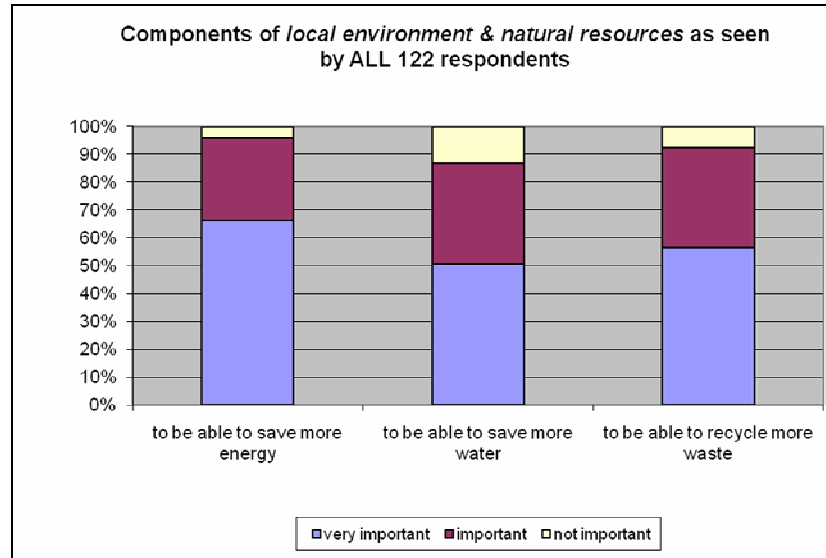
**Figure 3.6.** Components of Local Community by Area



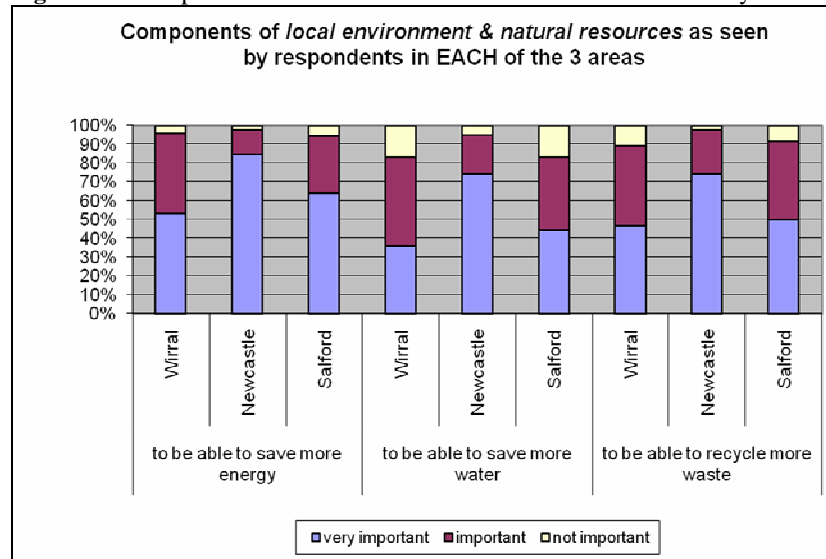
### Components of Local Natural Resources

As for previous domains, all 122 people interviewed rated the three components of *local natural resources* as either important or very important. The least valued is *being able to save more water*. Within each area, it was people from Wirral and Salford that were more likely to rate *being able to save more water* as not important compared to people from Newcastle.

**Figure 3.7.** Components of Local Environment and Natural Resources



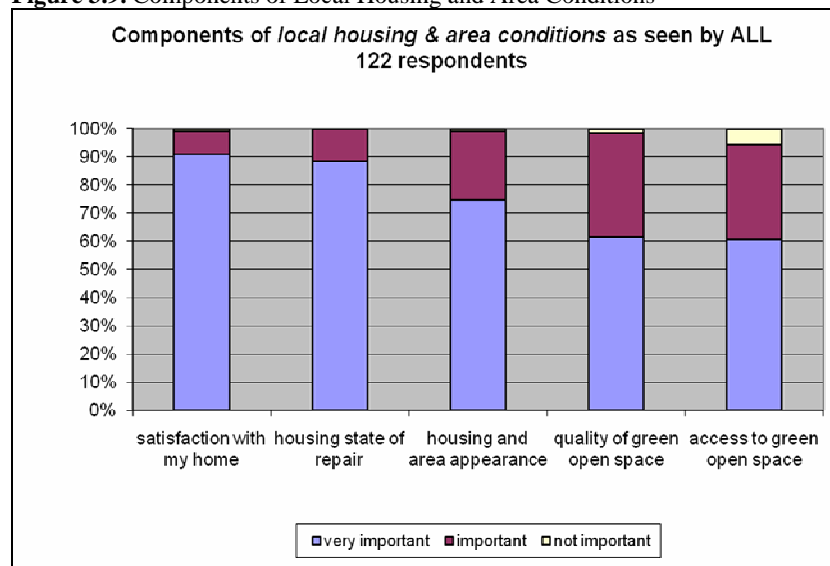
**Figure 3.8.** Components of Local Environment and Natural Resources by Area



### Components of Local Housing and Built Environment

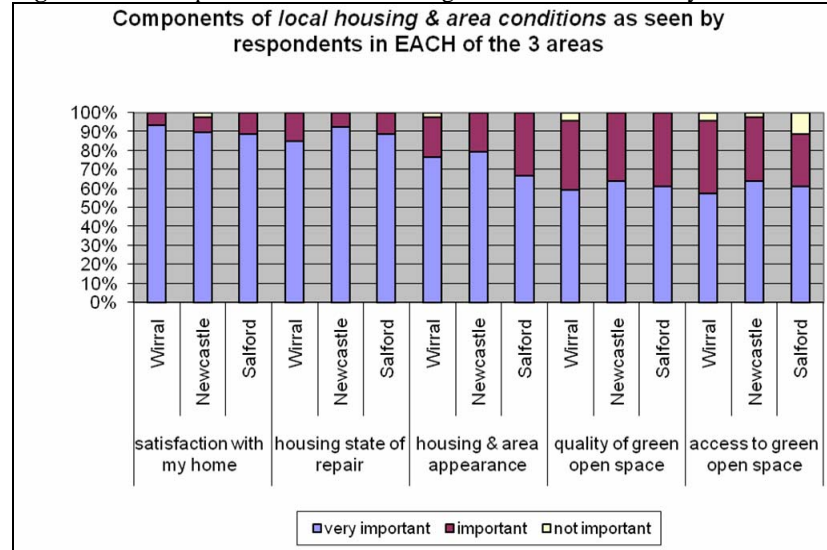
Almost every person interviewed rated all the components as important and very important. A very small proportion of people (5.7%) and most of them from the Salford regeneration area, rated *access to green open space* as a not important component of sustainable community. At the general and the local level, the state of repair of housing and 'satisfaction with my home' are the most valuable component of the 'local housing & area conditions' domain.

**Figure 3.9.** Components of Local Housing and Area Conditions



### Components of Local Services and Facilities

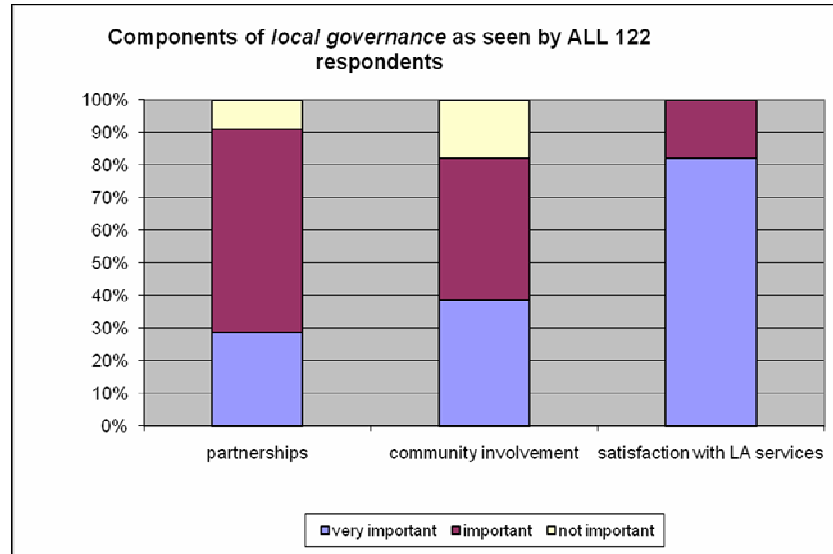
Whilst 'public experts' and academics raised the need to include *access to school* in the framework, this component has been rated by almost 40% of respondents as not important, in particular in Wirral and Newcastle regeneration areas. A significant number of people reported that they do not have children at all or children of school age and therefore *access to schools* in particular and schools in general are not important for them. However, a majority still rates it as either important or very important. The most valued component in all three areas and in general is *facilities & services in general*.

**Figure 3.10.** Components of Local Housing and Area Conditions by Area

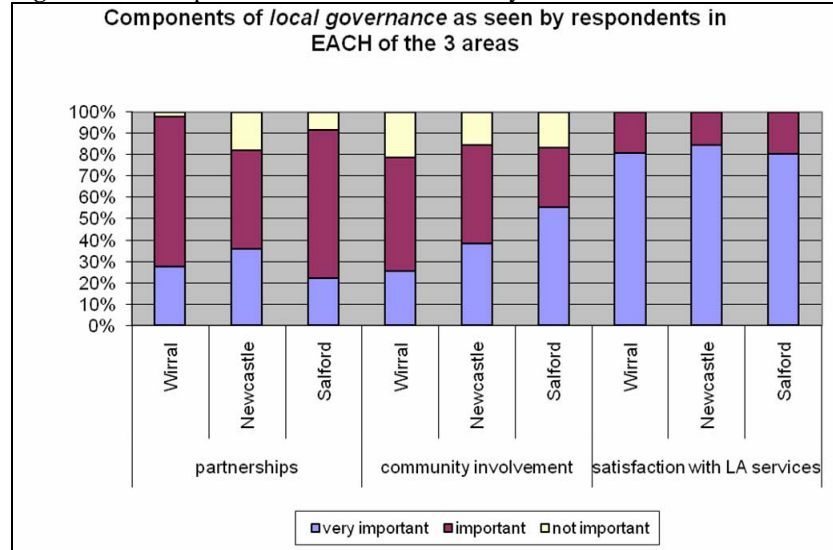
### **Components of Local Governance**

Within this domain, *community involvement* was rated overall as the least valued dimension. However, more than 80% of people rated it as important or very important. *Satisfaction with local authority services* was the most important component.

**Figure 3.11.** Components of Local Governance



**Figure 3.12.** Components of Local Governance by Area





## Conclusions and Final Remarks

This chapter introduced for discussion an *original* theoretical and methodological framework for assessing the impact of regeneration (more specifically large scale refurbishment of low demand housing) on community sustainability. The framework drew on the literature generated by the capability approach developed by Amartya Sen and others over the past 30 years. More specifically was inspired and learnt from the methodology of populating a list of capabilities, that is to say from the way one may be able to select relevant *dimensions* (whether of domains or components) on a list of sustainable communities.

In terms of policy implications these findings bestow some good and some bad news. The good news is that many (if not all) of our dimensions of sustainable communities could be found on a wide range of ‘official’ lists of sustainable communities and, as demonstrated by this research, they represent indeed what people at the very roots of regenerating low demand housing areas *value* and *understand* in terms of sustainability of their community. We do not imply here that these official lists (usually evidence based and drawing on a wide range of expertise) do not include local residents or communities views. They do, to a certain extent, as they are usually the end result of lengthy and expensive consultative processes. However, they do not focus on people’s or communities’ *values* (in order to assess community sustainability) but on what ‘experts’ think should be assessed. Moreover, the process behind the creation of these lists is not transparent and democratic – and nobody could quite say why certain dimensions are on these lists while others are not.

The bad news is that once having a ‘list’ of sustainable communities, that list cannot be universally applied elsewhere. Policy makers prefer ‘one size fits all’ approach and to universally apply ‘official lists’. This cannot be the case as people and communities have different *values* and *understanding* of sustainable communities, influenced by their very local context and circumstances. Hence, despite the fact that ‘lists’ could follow general principles as shown in this paper by comparing the three areas, they should be the result of a highly contextualized selection process – if not for every area which could be indeed very resources consuming, at least for each regeneration program – for example one ‘list’ should be designed for regenerating low demand areas in the North and a different one for regenerating and re-building existing communities in the South-East of the UK.

Finally, two further points need to be clarified. First, the framework was tested on a relatively small and purposive sample. Although the sample for each area aimed to replicate area's profile in terms of housing tenure, economic activity, ethnicity, household composition, age and gender, one needs to be cautious about the level of generalisation these findings may imply. However, the areas being very small and researched 'to death', the author is confident that the findings are representative for these areas – nevertheless more research is needed in this direction and we hope that this paper will be of assistance. Second, and as highlighted previously, the framework for sustainable communities proposed here does not represent a 'recipe'. It is more about a process – even if we chose to plainly explain what sometimes might seem the obvious, it is because we sought to stay true to the methodology that inspired this paper – and open our rationing to open debate. Moreover, this framework is highly contextualised through layers of participatory consultation with people involved in and living in these regeneration areas. This may mean that although general principles and ideas could be applied elsewhere, little else is of any significance for other regeneration initiatives.

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## 4 Sustainable Urban Decentralization Through Climate Integrated Design

*Arjan van Timmeren, Dick Sidler and Marleen Kaptein*

A topic of interest in sustainable urban planning and regeneration is the lack of integration of the 'essential' or 'critical flows' (water, energy, waste/wastewater). This chapter focuses on the spatial, technical and social integration of an integrated waste (wastewater) energy system for an urban neighborhood in the green district 'Lanxmeer' in Culemborg, The Netherlands. The district consists of approximately 250 houses, several offices and a 'City farm'. The district is situated in an ecologically sensitive area, because it concerns a former drinking water extraction and retention area. The design of the district and the building is based on permaculture, Reggio Emilia and organic design principles. An innovative mixture of 'red and green' development is presented (urban agriculture), together with a concept of integrated decentralized technologies for wastewater and organic waste treatment with energy, carbon and nutrients recovery.

A central role in Lanxmeer will play the EVA Centre with attached 'Sustainable Implant' (S.I.). Principally, the concept is based on a small scale biogas installation (with treatment of black water and organic waste / garden & park waste) of the district, Combined Heat Power (CHP) and accompanying closed greenhouse for nutrient recovery and CO<sub>2</sub> bounding. The S.I. will be realized as a part of the EVA Centre and has an interconnecting role between both residential district and EVA Centre, inhabitants and visitors. Especially the social context concerning the people living in this urban neighborhood, the role of the S.I. and the Cityfarm(er) will be explained. Besides, the system layout, dimensions, maintenance, conservation and administration, and the possible consequences for the urban typology, the organization of the district and its inhabitants are discussed.

### **‘Feeding’ a Building on the Waste of an Urban District**

In this study, the limited and so-called ‘ecological interpretation’ of autarkic systems has been taken as a starting point: ‘systems that are closed for matter and energy, except for the continuous flow of solar energy’. The decentralization and, in some cases, even complete disconnection of central (infra)structures are at the centre of the developing emancipation of systems of which they are a part.

Two development processes concerning decentralized technology for the purpose of autonomy have come forward as topical: first, the efficiency and improvements in the integration of sub techniques and ‘real-time’ coordinated, connected concepts (Hartman, 2002), and, second, a better harmony between supply (input) and demand of the (different) sub flows (Künneke *et al.*, 2001). Additionally, there are two more general underlying development processes. The first is the environment-technical, environmental and, to some degree, also social optimization of decentralized systems within semi-autonomous projects. The second underlying development process concerns the link to economic applications related to the surroundings, often determined by soil or users, including taking carbon and nutrients back to agriculture and other lateral applications or possibilities. The presented case study incorporates both development processes.

The main case study within the research in which interconnection of public utilities and local autonomy has been elaborated is the city district EVA Lanxmeer. It concerns an ecological settlement in the small-scale city of Culemborg. The location of the EVA project is near the central railway station of Culemborg, on 24 hectares of agricultural land and some orchards (Figure 4.1). This was the first time in the Netherlands that permission was given to build in the vicinity of, and partially even within the protection zone of, a drinking water extraction area. The regional government allowed building at this site only under the guarantee that it would carefully be built according to modern ‘deep green’ principles.

In the concept of the plan, different ‘tracks’ can be distinguished: urban design, landscape, mobility, participation, communication/knowledge transmission, energy and water management, and sequence management. Along each track, the experts involved can formulate their own innovative aims. These innovations converge within the project team. The (future) residents also have a definite position in the urban design process. This

discursive model is conducive to bringing important environmental matters to the fore at an early stage.

The district has a low housing density. Because half of the district has the status 'water catchment area', and the entire district has been designed in accordance with strict environmental conditions, it was difficult to build compactly. Instead of high density, the aim here was to create multi-functional space. This has already been achieved by building in a water-catchment area where urban-density construction had previously been forbidden. Moreover, the plan integrated living, working, recreation and education by attaching workers' accommodation to the housing and by including offices and businesses within the planning area. The structure of the urban plan is mainly based on the record of the existing landscape. Especially the subterranean structure has been used for the overall plan, the water zoning- and ecological plan. Further, the general principles of Permaculture affected the spatial structure of the plan. There is a gradual transition from private-, semi-private-, and public space towards a more natural landscape in the protected zone of the Water Company. Together these green zones form an environment that displays the diversity and resilience of natural ecosystems. It can be called the 'Park of the 21<sup>st</sup> century' (Timmeren & Röling, 2005), particularly due to the added links to the water-, energy- and waste concept of Lanxmeer. The project has been carried out in small-scale phases and will consist of approximately 250 homes (of which 13% apartments) with a mix of subsidized rental and owner-occupied housing, collective permaculture gardens, business premises (40,000 m<sup>2</sup> gross floor space) and offices (27,000 m<sup>2</sup>).

**Figure 4.1.** Lanxmeer District with Orchard, Drinking Water Extraction Area, Retention Ponds & Helophytes (left) and Court Yards (right)



Source: [www.eva-lanxmeer.nl](http://www.eva-lanxmeer.nl)

***The EVA Centre with Sustainable Implant***

At first the district's energy concept had autarkic living as its main principle. During the process of development this became difficult to implement with the available budgets. The municipality hoped to realise an energy performance coefficient (EPC) of 0.7 and an energy consumption of less than 40 gigajoules per household. The normal energy use per household in the Netherlands is 75 gigajoules. Because of the original concept of autarky and, consequently, the requirement for energy being available 'on demand', it was also decided to use chemically bound energy, in the form of biogas at district level.

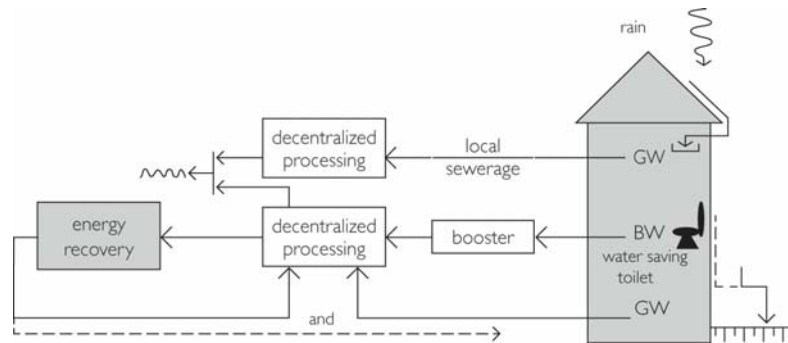
The production of gas from (green) waste flows in the district has two positive effects at the same time: not only does gas become available, but also there will be no need for a connection to and/or upgrading of the (surrounding) public sewage system. For the production processes it is of importance that the percentage of solid substance in the fermenter is as high as possible: the energy content of black water is determined by the solid mass. Therefore, it is of importance to decrease the quantity of flushing water as much as possible.

To achieve this, nine different configurations for the waste (water) infrastructure (and processing) were analysed thoroughly for eight environmental criteria (health guarantees; security of supply and consistency; use of raw materials; pollution of soil, air, ground area and surface water; support of 'closing cycles'; energy use; resilience to incorrect use and sabotage; and future value), eight spatial criteria (optimisation transport configuration; use of materials; adaptability and extendibility; screening of against vandalism and sabotage; use of (ground) surface area; fitting into the living environment; accessibility of parties involved; and aesthetic quality) and five social criteria (comfort for users; costs; ease of use; empowerment / independence of specialized institutions; image and transparency for users). Although the option of separated infrastructure systems for grey water and black water, with a vacuum black water sewerage system came out best, the second-best option of using a booster for each 8 houses was chosen by the municipality – in its role as project developer – (Figure 4.2). This was mainly due to the phased realisation of the district and the connection to the existing sewerage infrastructure at first. The combination of black water and green waste offers advantages. Firstly, the amount of biomass available will be higher and therefore the gas proceeds will be larger; secondly, the 'fresh black water' implies a constant supply of fer-



menting biomass, which is good for the stability of the fermentation process.

**Figure 4.2.** Transportation Option for Waste Waters



The fermentation of waste is not the end of the process. Other integral parts of the process include using the gas for energy generation and purifying the liquid effluent of the fermenter to a level that it can be discharged into the surface water without major problems, and processing the sludge without odours nuisance into fertilizer.

Because of the E for Education in EVA, also a Living Machine (Todd and Josephson, 1996) was integrated for the purification of small part of the hotel and leisure facilities. With respect to the necessary exploitation of the system two extra decentralized concepts for the district were added, viz. a facility for further separating twelve non-organic waste fractions called 'Retourette' or 'Recycle Shop', and the "E- Fulfilment" for joint e-commerce supply.

***Combined decentralized facilities: introducing the 'Sustainable Implant' (SI)***

The SI has been planned on the transition of the district into the surrounding (urban) areas, in the same lot where the Eva Centre and the hotel are to be built. The technical installations will be integrated in an architectural solution (see Figure 4.3), in such a manner that they will take up as little space as possible. The process of producing biogas (energy generation) and wastewater treatment can be divided into various sub processes:

1. Gathering black water on the one hand and green household waste (and to some extent garden waste) on the other, and leading them into the system;
2. The fermentation process, with biogas, effluent and sludge as its output;
3. Purifying and improving the gas into natural fossil gas equivalent;
4. Purifying the effluent until it has surface water quality;
5. Composting sludge into usable garden compost.

In addition a collection facility for waste and e-delivery, and a re-use step concerning the methane (biogas), water and carbon are added:

6. Collection of separated waste flows (Retourette) & e-delivery goods of the district;
7. Using the biogas in a combined heat power plant (CHP), CO<sub>2</sub> in glass-houses and purified water in the spa & vitality facilities.

**Figure 4.3.** EVA Centre with Integrated Sustainable Implant (left)



Advantages of the anaerobic digestion based on blackwater and organic waste include getting rid of the inconvenience and cost of the (individual) green rubbish bins. This, however, can only be accomplished if the green waste is collected with a much higher frequency than the current once every fortnight. In Lanxmeer this will be an important role for the 'urban farmer' of the city farm 'Caetshage', who will also perform the management tasks for the installations. The fermentation process takes place with a temperature of approximately 30 degrees Celsius, fully automatically. Its stability is guaranteed by sufficient organic waste being fed into the system and as long as bactericides are avoided. Therefore, there is a risk that residents want to disinfect their toilets in case of illnesses and use cleaning products for that (bleach, lysol etc.) that do not harmonise with the fermentation process. Unwanted objects (in the green waste) can also damage the installation. The biogas is a mixture of 65% methane, 34% CO<sub>2</sub> and some remaining gases (with a maximum of 1%), e.g. sulphur hydrogen. Sulphur

compounds are harmful and, furthermore, they produce a very disagreeable odour. The desulphurising process largely takes place in a biocatalytic way in the fermenter by adding predetermined amounts of oxygen on the threshold of gas/fluid.

The CO<sub>2</sub> content determines the incineration characteristics of the gas, as a function of the Wobbe index and the calorific value. For application in home appliances it is necessary to adjust the CO<sub>2</sub> content in such a way that the improved gas will be natural fossil gas equivalent. In addition to the biogas, the digestion output of the fermentation process (approximately 5 m<sup>3</sup>/day) consists of slurry, that is divided into a solid fraction (approximately 40% solids) and a fluid fraction by a screw press.

The fluid fraction is free from pathogens. However, it is still polluted, so that extra purification is necessary before it can be discharged to surface waters (Sidler *et al.*, 2004). This can be done simply by using helophytes filters. However, as there is a Living Machine based closed glasshouse, designed as a double skin façade of EVA Center (to protect the center from noise nuisance from a nearby railway and for educational purposes), the effluent will be added to the input flow of the Living Machine. There are two solutions for the solid fraction from the screw press: compost it in heaps in a well-closed compost room, or entering the slurry from the fermenter into the Living Machine. Because of uncertainties with respect to the process quality of this sub flow in the Living Machine and the studied option of agricultural harvesting, the first option was chosen. An advantage of using a compost room is that also the final maturation can take place there. After the maturation, the compost can be removed and brought back to the city-farm. The air in the compost room is extracted and purified by a bio-filter.

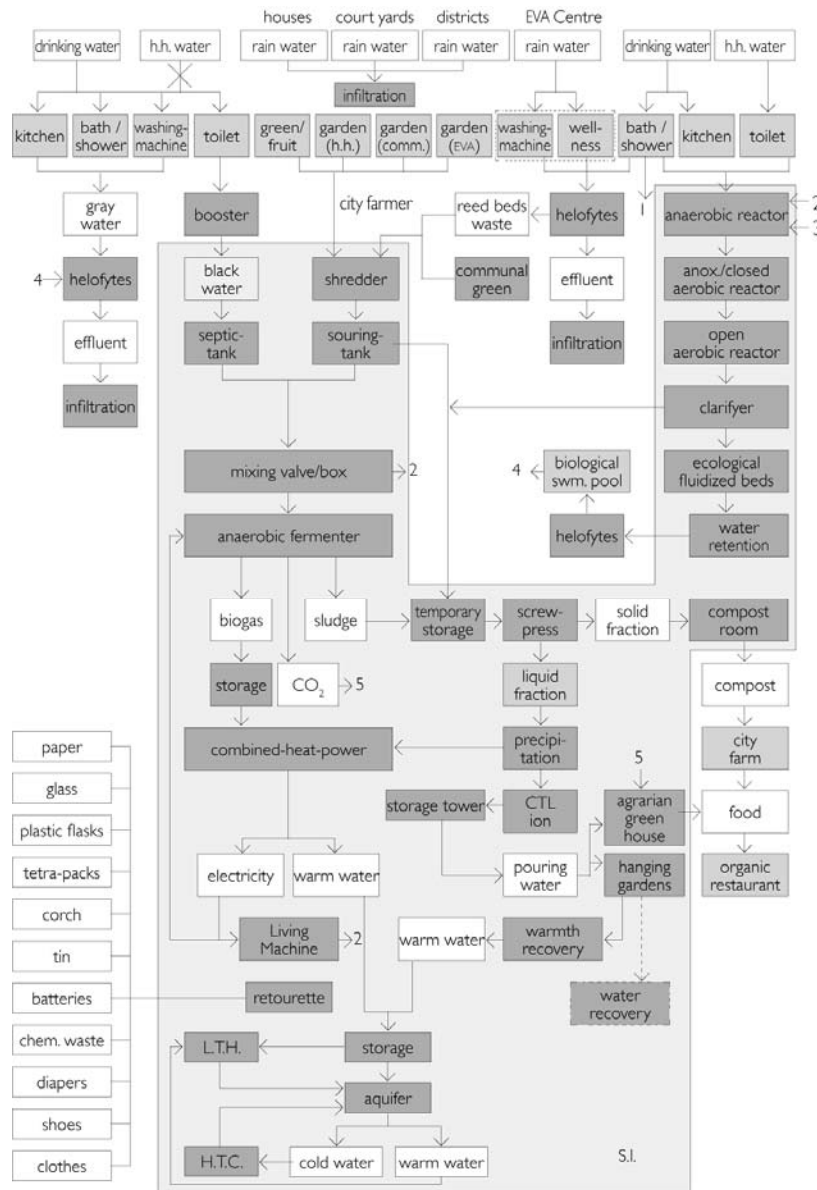
For the dimensioning or specification of the system 520 residents and a constant supply of 365 days per year are assumed, with the exception of garden waste (183 days per year). The amount of blackwater is estimated at 15.5 liter per person per day (with a COD and solid substance/person\*day of 135 and 90 grams, respectively). Additionally, 0.5 kg of vegetable and fruit waste/person\*day are taken as an estimate (chopped up volume weight 1,000 kg/m<sup>3</sup>, with a solid substance content of 30%, organic substance content of 78%, and COD production of 1.5 kg per kg solid substance). The garden waste is estimated at 0.8 kg/m<sup>2</sup> for an average lot size in the district of 150 m<sup>2</sup> (chopped up volume weight 550 kg/m<sup>3</sup>, solid substance content of 78% and COD production of 0.4 kg per kg solid substance).

All material flows come together in a mixing basin after leaving the first components of the system, the sedimentation basin and the chopping basin. From there, various flows are led to the fermentation tank and mixed as needed. The length of stay in the fermenter should be at least 20 days. After these 20 days the assumed COD and solid substance reductions have taken place and the slurry can be transported to the next step in the system. For a total material flow of 1,073 m<sup>3</sup>/year and a minimal length of stay of 20 days in the fermentation tank a tank size of at least 70 m<sup>3</sup> is required. This leads to a total annual gas yield by the fermentation process of 26,624 m<sup>3</sup>/year. For the amount of digestion produced daily (maximally 4 m<sup>3</sup>/day) an in-between reception tank of 10m<sup>3</sup> has been provided, because of the small volume. The total volume of material flow to be composted is 198 m<sup>3</sup>/year, or 0.5 to 0.6 m<sup>3</sup>/day. The fluid fraction to be entered into the Living Machine is 875 m<sup>3</sup>/year, or approximately 2.4 m<sup>3</sup>/day. After the slurry has been fermented and drained, a room is needed for the slurry to be composted within two to three weeks.

There are more benefits. For example, the local small-scale sanitation can cause less expansion of the present conventional sewage purification installation. In addition, there is a (small) reduction of CO<sub>2</sub> discharge and some energy saving. In the current configuration with CHP and composting of the sludge in the basement approximately 194 kg/home\*year of CO<sub>2</sub> reduction for this district of 250 homes will be prevented (Sidler *et al.*, 2004). There is also some reduction of waste collection and energy saving as a result of transport and pumping energy saved.

The biogas from the fermentation tank is used in a small Combined Heat Power (CHP) installation (Figure 4.4). Afterwards, a net amount of approximately 70 natural fossil gas equivalents remains and electrical energy surplus of 81 kWh/d remains to be sold (Sidler *et al.*, 2004). From an economic standpoint this amount of gas to be obtained is too small for the investment and exploitation of the installation. Therefore energy revenue is introduced and used within the EVA Centre through the S.I. (Figure 4.5). When this saving is also taken into account, the total energy saving of approximately 8 GJ per home is produced by the biogas installation (Vries & Timmeren, 2006).

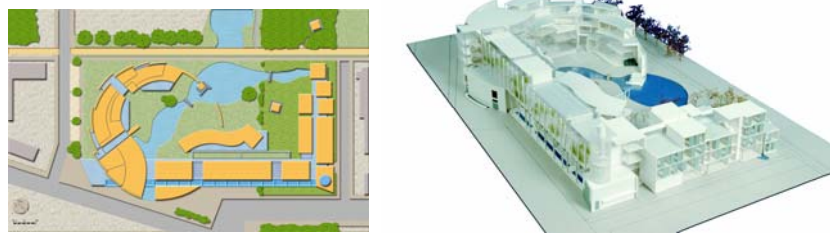
**Figure 4.4.** Treatment and Cascading of Waste and Water Flows in the Sustainable Implant



## Spatial Integration of the Sustainable Implant

Local interventions, e.g. with regard to sustainability, can be made without leaving the existing scaling-up. The overall design of the district Lanxmeer and the architecture of the most of the buildings is based on permaculture and organic design principles.

**Figure 4.5.** Conceptual Plan and Model of the EVA Centre



The triad ‘City Farm Caetshage’, ‘Sustainable Implant’ (SI) and the ‘EVA Centre’ form the important ends (or beginnings) of the main east/west greenbelt that forms the backbone of the Lanxmeer district. The City Farm is situated in the originally agricultural area in front of the water extraction area. Though the purchase of their home the residents contribute to the realisation costs. In return the residents can visit the farm freely, and if desired can help with the maintenance of fields. Nevertheless, the City Farm is supposed to work independently.

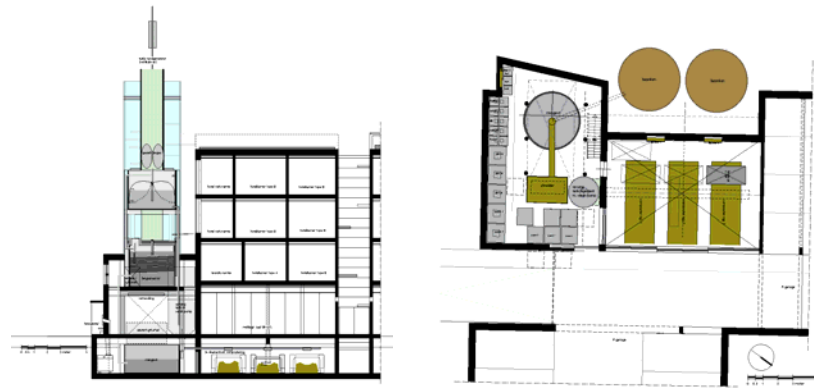
An important role is set aside to the maintenance aspects and collection of green waste by the city farmer. Together with the green waste of other green areas of Lanxmeer, the kitchen- and green waste of the houses (‘garden waste’) and Lanxmeer’s sewage effluent, this is being transported to the Sustainable Implant by the city farmer (Figure 4.6).

Essential for this type of local solution is the way that possible types of trouble are dealt with. The main environmental aspects here include noise nuisance, odor trouble and dust trouble. Noise nuisance can be the result of waste collection and nuisance caused by the installation.

In the Netherlands there are also restrictions for odour nuisance. Effective biofilters should guarantee that this will not occur. As far as dust is concerned, it can be observed that there will not be any dust emitting processes in the installation. The Living Machine is perceived as a positive fac-

tor, looking like a ‘green’ hothouse and oasis, while the larger part of the fermentation is carried out under surface level. The SI can be divided into two main components.

**Figure 4.6.** Sustainable Implant within the EVA centre (left: section, and right: basement plan)



The first main component consists of the anaerobic fermenter, CHP, Composting room, Retourette and e-fulfilment miniload. This part of the installation is situated in a closed, garage-like volume in the southwest corner of the building complex. On top of this mainly closed volume the new ‘water tower’ is situated with storage of biogas (in inflatable bags) in the centre of the tower and retention of the water effluent round about this core in the transparent volume, cascading down in five (repeating) levels.

The second main component of the SI consists of the water retention cisterns, a sealed double skin façade with wastewater treatment of the EVA Centre (Figure 4.7), the agricultural glasshouses and ‘hanging gardens’ and the heat recovery installations with seasonal storage in aquifer. Three of the installations within this second main component (the façade, the solar-cavity spaces with hanging gardens and the agricultural glasshouses on top of the building) are fully integrated in the design of the EVA Centre. Most visible is the double skin façade, defined as a ‘vertical glass-house’. Inside this glasshouse, wastewater of the EVA Centre (hotel, conference centre, restaurants and wellness centre) is being treated in a Living Machine like configuration. The façade is situated in a noise nuisance zone due to its location parallel to railways.

**Figure 4.7.** The Sustainable Implant Integrated in the EVA Centre.***Risk factors***

As the proposed system configuration and spatial elaboration concern an integrated approach, it is important to reflect on the risk as well as the success factors that might influence the implementation process.

The risk and success factors are:

- Health risks in case of breakdown of collection and/or management/maintenance technical units: because of breakdown of the collection, waste may pile up with health risks or other types of nuisance (view, smell, vermin) as possible consequences. A similar problem occurs in case of maintenance of the technical units (changing filters, etc.). Therefore, a back-up scenario is available for replacing labour and materials.
- Safety: a safe distance of 5 to 20 metres has been set down between the fermenting plant and the gas depot. The type of gas depot is decisive for this. The safety zone for the chosen configuration is 5 metres. Changes in system composition and configuration influence this zone (distance) and the integration possibilities of the plant.



- Noise: outside of the usual working hours, but actually during the complete twenty-four hours of a day, noise nuisance is not allowed. Within working hours, the noise of the technical units or, for example, of the supply or removal of garden & park waste or compost may be perceived in rare situations.
- Smell nuisance: frequent smell nuisance is forbidden by law. Hence, the constraint of a closed space (also for “dumping” and composting; the stench cycles are connected with the storage of the products to be fermented). The bio-filters must prevent smell nuisance from occurring. The moments of filter change must be short and rare.
- Dust: the unit must not produce (extra) dust in its surroundings. The plant must not contain dust emitting process steps. The only possible sources of nuisance are the composting and dumping of waste. To be certain, each of these activities, therefore, has been placed in separate closed spaces and an water mist device will be installed.
- Incorrect use (process obstructing substances in waste and/or waste water): (repeated) information and an intentional community are decisive for good acting by occupants.
- (Manageable) costs: for this purpose, an economic model will be drawn up in an early stage in close collaboration with all the parties concerned.
- Dimensioning: This is important when closing the cycles, when the emphasis often is on quantity (tuning output and input of the various processes). If the project (the composition of the district), the users/occupants (life style) or the surroundings change, plants may be dimensioned insufficiently large or too small.
- Loss of system parts: because of the importance of direct application of the return flows of the S.I., a (very) nearby “contractor”, in the sense of a receiver/user of the return flows, is required. In Lanxmeer, these are the EVA Centre (with a relatively high heat demand) and the City Farm (with a sludge or compost demand).
- General disadvantages of (types of) self-management: the integration of the various solutions into one facility and the choice for having the essential (or even all) public utilities under own-account management produce certain risks in relation to quality and continuity. There must be back-up facilities for the essential facilities (supply of drinking water, waste processing, energy supply). In the details of the S.I. in EVA Lanxmeer and the EVA Centre, the current surrounding infrastructures are used for this purpose. What has remained is the construction of one central connection to the sewer system and the electricity grid. When details of the “fall-back positions” are worked out and there is sound

self-management, the risk of disturbance of the public utilities can become even smaller than is the case with dependence on central grids.

- Legal impediments: for example, jurisprudence shows that domestic waste flows, including garden & park waste, are not considered as positive-list products that can be mixed and fermented with sludge. This means that it is uncertain whether the digestate (fermented product) from the fermenter can be considered a fertilizer to be processed within the framework of rules and regulations, even though manure is added. If this is not the case, the digestate must be removed as waste and other solid or semi-solid organic waste (e.g., park waste) will serve as a substitute.
- Overheating of the vertical greenhouse: a fully closed system has been chosen for using heat from the greenhouse. There is a risk of damage for the purification plants and, particularly, for the planned agricultural plants (with temperatures over 35 degrees C). In that situation, the cooling system based on return water from the aquifer will not suffice, so that there must be a possibility to open the greenhouse.

In complex issues, part of the uncertainty is structural and cannot even be eliminated. These are the non-technical uncertainties, including feasibility and acceptability. This type of uncertainty can only be tested, and perhaps solved, in practice through pilot projects and niche planning. Increasing complexity in the development process produces additional conditions. Abandoning the serial way of working (policy, planning phase, design, implementation, and management) is crucial. Particularly, the steps from the planning phase to design and implementation are often problematic.

## **Realization Through Participation and Interaction**

In the democratic triangle formed by the three main groups of parties involved, government, market and citizens, the relationships are changing at the moment due to government withdrawal and the accompanying liberalization processes. The former relationship between the State and the citizens has been transformed into an alternating network of collaborative structures. The result is a changed process of coordination and participation in residential areas. This leads to a larger interest to involve users and other relevant parties into the planning processes as early as possible to get more extensive commitment. There is always a basis for collaboration with various parties involved in a process, irrespective of individual, sometimes conflicting aims. In order to have many relevant parties participating,

groups (of partners) are selected normatively or according to their “power” and influence in the residential area.

There is an important task for designers and planners such as mapping people’s demands, and supporting and visualizing the concrete common aims. Design should focus on the physical context of quality of life and sustainability, with an emphasis on the creation of conditions for spatial, social and environmental qualities. Parties should realize that the involvement of inhabitants/users goes further than just the change in design and/or construction. The process should create a structure that supports flexible and continuous change and is continuously capable of absorbing corrections through permanent reflection and learning. Also because of the possible learning processes, optimal communication and involvement are vital for pluralistic decision-making. The Netherlands has two models of decision-making for the (technical) infrastructure and its accompanying systems: the “referee model” that places the problem of difficult decision-making among opposing individuals, interest groups and lower authorities; and the “interaction model” using coaching and consensus among partners to integrate the systems to be used and to contribute to quality improvement.

Within the scope of the research underlying this project, the “interaction model” was chosen. The advantage is that people can be prevented from working up to a solution in the shape of a specific infrastructural project too quickly, without sufficiently thinking about the relationship between the suprastructure (what do we want) and the infrastructure (how can we best accomplish this goal). A sound method of decision-making following this interaction model is the so-called “co-production” recognizing the existence of mutual dependence between various parties and interests. This method has been applied in the EVA Lanxmeer project.

## Conclusion

To be able to change the built environment in accordance with the principles of sustainable development there is a need to turn around the inter-relationship between the infrastructure and the societal needs, or ‘supra-structure’. Decisive aspects in an urbanizing and connected world with crucial dependency on integrated networks will be the generation, treatment and transport of the critical flows; the adaptability to alternative technologies; and the overall independence and resiliency to failure and

inaccurate use of space (Timmeren, 2005). Differentiation and urban flexibility of buildings and infrastructures are pre-conditions for anticipating long-term uncertainties, rising complexities and climate change. Sustainability at the urban scale requires a change in the general attitude towards the design, development, use and management of urban areas. A way to do so is the 'interconnection' of different themes and cycles within cities. An example is the linking of sanitation to energy- and food production, preferably at lower scale levels.

The Sustainable Implant, as presented in the EVA Lanxmeer project cannot be regarded as a design solution that can be replicated in a mechanical way. The instrument comprises a guiding principle for a sustainable solution to the mainly non-sustainable streams in new or existing neighborhoods. On a neighborhood level the S.I. entails the design of a more sustainable main structure for the transportation of water, nutrients, energy, materials and waste. Still a central grid connection will be needed: for starting up and for emergency back-up purposes. Specific local circumstances in most of the cases are a strong stimulus for the implementation of decentralized systems for closing cycles on a local basis.

Decentralized sanitation systems often offer a solution in places where traditional sewers are not possible, because of soil or water conditions, or related rules and regulations. Decentralized systems gain efficiency advantages as compared to fully centralized systems, particularly through the design of an integrated system of energy generation and supply, and through the connection of this system to a waste water treatment system coupled to nutrients recycling. In this case an anaerobic fermenter is used thus requiring a protected environment for development. The choices made arise mainly from technical and social optimisation. There are several reasons for less ambitious decisions with respect to the closing of local (waste) water flows in large scale applications. Occupants turn out to have more commitment when systems perform on the scale of a house or apartment, as compared to the scales larger than a district. As scale size increases, the supply and removal of waste(water) and similar flows get more and more anonymous and give less possibilities for integration with its source/users (the buildings / houses), with decreasing commitment as a consequence.

The introduction of solutions on an intermediate scale-level, like in Lanxmeer offers opportunities for autonomous design of the whole or solutions in which buildings can be semi-autonomous. The appealing, and partly realised, example of interrelated agriculture, waste(water) treatment and energy production in the urban district Lanxmeer in Culemborg might

be exemplary in a number of ways, including the expected change in people's attitudes and lifestyles.

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## **5 Spatial and Market Ambiguities of Densification in Activity Centres: Case Study South East Queensland**

*Mike Gillen*

### **Introduction**

Australian cities are currently undergoing demographic and development pressures that will continue to have a major impact on their urban forms for the next 30 years. The drive towards sustainability has resulted in a re-orientation of spatial policies towards a more even balance between greenfield and urban infill development. Recently released Australian metro-regional strategies share common themes in the desire for containment, integration and densification in order to attempt to deliver more sustainable urban forms.

Heralded as the third largest conurbation in Australia and the fastest growing metro-regional area, south east Queensland (SEQ) faces a challenging future as it seeks to deliver both a sustainable urban form and network of sustainable communities. The recently released regional plan for SEQ makes significant reference to the delivery of higher densities as a means to accommodate the significant population growth forecast for the next 20 years (OUM, 2005). A number of statutory strategic directions are presented which demand new planning and development responses. Principal among these directions are the focus on activity centres and transit oriented development. An additional requirement that some 40-50 per cent of future residential development across the region will occur on infill sites within the newly identified urban footprint, poses a significant challenge to planning and development action. Indeed, a range of concerns regarding densification remain and demand detailed investigation. Is there spare physical (land and infrastructure) capacity for increased densification? Are sites identified as having physical capacity economically viable? What spatial governance modifications are necessary to realise extra capacity?

Local authorities in SEQ are now required by the recent regional plan to undertake a mandatory local growth management strategy (LGMS). The LGMS will set out the scale of growth and the methods by which the local authority will seek to meet its regional quota of housing requirements, infrastructure and employment provision. A principal focus of the LGMS is the identification of opportunities for new and retrofit housing development in urban areas and the possible planning scheme amendments necessary to implement the LGMS.

This chapter provides an analytical account of the empirical findings and robustness and implications of employing such a tool for SEQ. The paper is divided into 8 sections. Firstly a brief outline of the density debate, secondly, a brief introduction to the context for urban change in SEQ, thirdly, an outline of the need for new tools to address new challenges; fourthly, a description of the localities and sources used in the empirical survey and fifthly, an account of the key stages and outcomes from the capacity study, including a summary of market ambiguities. Once the various study stages have been described the sixth section introduces the types of spatial governance modifications necessary to realise increased housing densities. The penultimate section provides a commentary on the robustness of the UHCT and is followed by the concluding remarks.

## **The Density Debate**

The current enthusiasm for strategies of densification is rooted within a broader debate on sustainable urban form. A key feature of this debate is a desire to create compact city forms, thereby arresting development at the urban fringe and concentrating it at higher densities within the existing urban fabric. The compact city and its policy context (most frequently referred to as urban consolidation in Australia) have been offered up as a panacea to the range of contemporary urban ills, however not without challenge (Troy, 1996; Puglisi and Fisher, 1998; Burgess, 2000; Bunker et al., 2002).

Throughout the last two decades a wide range of international practitioners and academics have supported and questioned the compact city philosophy. Newman and Kenworthy's (1989) seminal study analysed urban density and petroleum consumption in a range of Australian and international cities, suggesting that more compact, higher density urban forms should be encouraged, as they were associated with more sustainable resource use. This study prompted a significant stream of research that has



explored the benefits and constraints to densification. Advocates of the compact city suggest that higher densities decrease motor vehicle use, urban sprawl, energy consumption and pollution (Holtzclaw, 1991; McLaren, 1992; Frank and Pivo, 1994; Cervero, 1995; Schimek, 1996; Newman and Kenworthy, 1999; Mees, 2000; Hess and Ong, 2003). Such advocates also maintain that increased densities consequently increase public transit usage. However, whether or not densification can offer so many benefits remains a topic of ardent debate (Troy, 1996; Breheny, 1997; Neuman, 2005).

The desire on the part of policy makers in Australia to deliver sustainable urban forms has led to a policy consensus which supports notions of containment, integration and densification. The principal mechanisms for supporting such are urban consolidation in existing areas and the raising of densities around public transit facilities, more commonly referred to as transit oriented developments or activity centres. Recently developed metro-regional strategies for Melbourne (VDI, 2002), Sydney (NSW, 2005), Perth (WAPC, 2004), Adelaide (GSA, 2005) and South East Queensland (OUM, 2005a) share a strong policy emphasis on containment, consolidation and centres (Forster, 2006). Whilst this policy consensus adheres to the contentions of Newman and Kenworthy (1989; 1999) and Mees (2000) and is supported in the recent work of Curtis (2006), it is questioned on the grounds of social equity, affordability, resource efficiency and market realities (Troy, 1996; Gleeson, 2004; Birrell et al., 2005; Randolph, 2006; Forster, 2006).

The suitability, appropriateness and physical, social and economic limits of specific sites for increased housing densities are critical components of the densification debate and yet remain relatively under researched, at least in terms of the current urban focus (Ravetz, 2000; Searle, 2004). Concerns over capacity have in fact been a feature of planning and development discourse over many years, based around land availability debates (Tym, 1991; Adams, 1994; Bramley et al., 1995). The distinction with the recent focus on capacity is that it is sharply concerned with land within existing urban areas (commonly referred to as infill or brownfield land) and not the total amount of greenfield land released for future residential development. As Golland and Blake (2004, p. 258) suggest, the amount of research required to provide an assessment of the potential that urban locations may provide for extra housing is detailed and complex. A capacity assessment demands a robust methodological process, charting not only the physical capacity but market viability and timing of a sites release to accord a

measure of feasibility in meeting housing figures in local and or regional plans.

In the spirit of the urban renaissance which took place at the end of the 1990s in the UK, the Town and Country Planning Association in tandem with the Joseph Rowntree Foundation, examined urban housing capacity and the sustainable city (Breheny and Ross, 1998). The broad scope of this project charted the costs to reclaiming brownfield sites, design solutions for higher densities, target setting and monitoring, new institutional and legal arrangements and critically, new, transparent tools to measure the capacity of identified sites for densification. This project was influential in setting a new agenda for urban housing capacity monitoring, which culminated in the UK government's *Tapping the Potential: Assessing urban housing capacity* policy document (DETR, 2000). This national policy set a framework that now requires all local governments in the UK to undertake urban housing capacity assessments. Whilst it seems unlikely that similar Federal directives will occur in Australia, the direction and extent of change in our urban areas is significant enough to warrant new research, a renewed debate and new tools at the State, territory and local level.

### **The South East Queensland Context**

Covering a metropolitan area which extends from the Gold Coast to the Sunshine Coast and including at its centre the city of Brisbane, the SEQ region consists of 18 separate local consent authorities. The metropolitan region has a polycentric structure, characterised by a sprawling, low density urban form (Stimson and Taylor, 1999).

SEQ has experienced high and sustained population growth since the 1980s, growing at an average of 55,300 persons each year between 1986 and 2004 and is forecast to grow by a further 1.3 million people between 2005 and 2026 (OUM, 2005). This equates to the need for a further 575,000 new dwellings over the 21 year period.

Across SEQ, the identification of the economic, social and environmental implications of accommodating a further 1.3 million people over the next 21 years led state and local governments to the realization that the voluntary frameworks of the past were an inadequate tool to manage such growth effectively. New resources and improved implementation mechanisms would be required to manage the growth pressures that challenge the lifestyle and landscape of the region. Published in June 2005, the statutory

SEQ regional plan identifies the accommodation of future population growth as a critical challenge for the region and maintains that the principal desired regional outcome will be a more compact urban pattern of accessible, but also self-contained sustainable communities, based at activity centres and transport nodes (OUM, 2005). The regional plan maintains that up to 50 per cent of future housing development will take place on infill and redevelopment sites, maximizing existing facilities and services (see Table 5.1).

The data in Table 5.1 highlights a cascading down of housing figures from regional to local level. Whilst this is the simplest way to show the required housing targets it is by no means the last word. The discretionary nature of land allocation and the operation of physical and market constraints provide a significant level of uncertainty and potential controversy. Add to this the lack of history, limited practice, community antipathy and a paucity of research in the SEQ context to support and endorse the use and application of density tools and it becomes clear that a major challenge exists to the delivery of the infill dwelling target figures in the SEQ regional plan.

**Table 5.1.** Dwelling Targets by Local Government Area (2004-2026)

|                       | 2001      | 2004-2016 |         | 2016-2026 |         | 2004-2026 |         |
|-----------------------|-----------|-----------|---------|-----------|---------|-----------|---------|
| Local Government area | Dwellings |           |         |           |         |           |         |
|                       | Existing  | Total     | Infill  | Total     | Infill  | Total     | Infill  |
| Beaudesert            | 8,800     | 10,000    | 1,000   | 10,000    | 1,000   | 20,000    | 2,000   |
| Boonah                | 3,400     | 400       | NA      | 400       | NA      | 800       | NA      |
| Brisbane              | 359,000   | 82,000    | 59,000  | 63,000    | 56,000  | 145,000   | 115,000 |
| Caboolture            | 41,900    | 15,000    | 3,000   | 11,400    | 3,000   | 26,400    | 6,000   |
| Caloundra             | 32,800    | 17,500    | 4,000   | 17,250    | 4,200   | 34,750    | 8,200   |
| Esk                   | 6,000     | 900       | NA      | 1,000     | NA      | 1,900     | NA      |
| Gatton                | 5,700     | 1,300     | NA      | 1,100     | NA      | 2,400     | NA      |
| Gold Coast            | 180,900   | 74,000    | 35,000  | 62,500    | 30,000  | 136,500   | 65,000  |
| Ipswich               | 45,600    | 42,200    | 6,000   | 35,000    | 7,800   | 77,200    | 13,800  |
| Kilcoy                | 1,400     | 200       | NA      | 250       | NA      | 450       | NA      |
| Laidley               | 5,000     | 2,000     | NA      | 2,700     | NA      | 4,700     | NA      |
| Logan                 | 58,200    | 7,100     | 1,500   | 8,500     | 3,000   | 15,600    | 4,500   |
| Maroochy              | 53,100    | 30,000    | 7,000   | 11,000    | 6,700   | 41,000    | 13,700  |
| Noosa                 | 21,200    | 3,000     | 1,500   | 1,200     | 1,000   | 4,200     | 2,500   |
| Pine Rivers           | 41,400    | 16,500    | 4,000   | 12,700    | 4,100   | 29,200    | 8,100   |
| Redcliffe             | 21,500    | 4,400     | 2,500   | 2,500     | 2,100   | 6,900     | 4,600   |
| Redland               | 43,400    | 12,000    | 4,000   | 5,500     | 4,100   | 17,500    | 8,100   |
| Towoomba              | 34,300    | 6,500     | 1,500   | 4,000     | 2,000   | 10,500    | 3,500   |
| Totals                | 963,600   | 325,000   | 130,000 | 250,000   | 125,000 | 575,000   | 255,000 |

Notes: NA = Not applicable

Source: OUM (2005) South East Queensland Regional Plan 2005-2026, Department of Local Government, Planning, Sport and Recreation.

## Activity Centres

The focus on activity centres in the regional plan confirms the decentralised consolidation approach of the regional plan, acknowledging the fact that the metropolitan structure is fundamentally polycentric. It also forms a central component of the state government's goals of increasing the patronage of the existing public transport network.

The aim of the centres network is to provide a community focus in compact, self-contained patterns, assisting the delivery of a more sustainable urban pattern and providing more equitable outcomes. Broader intentions include the facilitation of economic growth through co-location of a range of land uses, including employment, housing and urban services and the delivery of improved accessibility. Strategies include better management of private travel via encouragement of multi-purpose trips and shorter travel distances. The plan also focuses on the accommodation of higher residential densities which support high levels of employment and trip generating activities.

In total some 55 centres have been identified across South East Queensland across a hierarchy of centres including primary, principal, major and specialist centres. Each of the urban centres identified is envisaged to accommodate a range of land uses and services and is the focus of major trip generations. Most of the centres identified in the regional plan are on, or close to, public transit routes, though not all on fixed rail networks. For each of the urban centres, but particularly the principal and major centres residential densities are to be significantly increased in an attempt to deliver greater vibrancy and to improve the patronage of public transport modes. Residential densities in the principal centres will range between 40-120 dw/h and in the major centres will be between 30 and 80 dw/h (OUM, 2005).

The principal form giving controls for new development in the activity centres are to follow the basis of the now ubiquitous transit oriented development (TOD). The principle of TOD demands an integrated settlement structure based upon high quality, high frequency public transit corridors and at the same time demanding a range of mixed land uses, increased densities and the development of a highly accessible environment within 6-800 metres of the transit node. The idea being that increased benefits will accrue from reduced congestion and air pollution from increasing densities at identified TOD centres.

Effectively, the activity centres aim to direct the market to identified locations based on transport corridors. The primary delivery mechanism is through an administrative allocation of land via regulatory planning processes and the suppression of development in non-designated areas. It needs to be questioned as to whether this will provide sufficient incentive to deliver new infill housing in identified centres. Recent urban history suggests that low density, suburbanisation is a strong, continuing force and the costs associated with infill densification discourage its development (Newton et al., 2001, MacDonald, 2006).

### **New Challenges and New Tools**

The scale and scope of the demographic pressures and need to direct development to the most suitable and sustainable locations in the SEQ region demand new policy considerations. The specific form of which will challenge the extant spatial planning frameworks and existing institutional arrangements.

Current tools for the assessment of capacity for increased housing densities tend to be based on simple density multiplier mechanisms. Little research in to the actual methods used in formulating spatial policy for housing targets has found its way in to the public domain. The observations in this paper are based primarily on anecdotal evidence and the research carried out whilst undertaking this project. The employment of crude assessment methods tends to be quantitative, summing up the total area of land identified as suitable for development and multiplying this by housing density ratios to arrive at unconstrained housing figures. A qualitative understanding of the appropriateness of the sites selected for development and the possible range of constraints to realising their potential are often absent.

Any new tool that demands significant changes to the existing urban form will require a high degree of public scrutiny and input via transparent and democratic processes for participation. The history of state and local government proposals for increased housing densities in SEQ (but particularly in Brisbane) is however littered with public opposition, emotional arguments and failure. During the 1990s the then lord mayor, Jim Soorley, was criticised for his '*Sardine City*' strategy for Brisbane's inner suburbs (Mephram, 2005). In 2002, proposals to have the Brisbane City Plan amended to increase densities in Holland Park West were defeated by heated community opposition (Mephram, 2005).

Overcoming community opposition to future density increases is unlikely to occur if technical bureaucratic exercises take place based on satisfying the minimum standards for community consultation. Unfortunately, operational efficiency (usually meaning little room for democratic participation) and investment attraction seem to be the keystone for change in Australian spatial governance systems. By contrast, the central point of consensus among communicative planning theorists is that '*planning is more than anything an interactive, communicative activity*' (Innes 1995: 184), demanding transparent and iterative forms of community participation (Hillier, 1998; Carp, 2004).

The abstract application of spatial administration policies which increase densities and directly impact real, but often unsuspecting, communities is unlikely to engender community support. Hence, there is a direct need to improve the channels for meaningful community input and education about the scope and impact of densification if the preferred urban form of the SEQ regional plan is to be both supported and attained. At present, the Brisbane City Council is in fact addressing this deficiency in its Neighbourhood Planning exercise, identifying areas suitable for future change and eliciting community opinion on the types and form of that change. This exercise provides a positive catalyst to the need for greater community participation in spatial planning in SEQ.

During 2006 the School of Geography, Planning and Architecture at the University of Queensland developed and piloted an UHCT on behalf of the Queensland Government's Office of Urban Management to assess the capacity of transit based activity centres for increased residential development. The selection of three transit-oriented localities demanded some consideration of a range of uses beyond residential which may catalyse transit-oriented potential.

The UHCT followed the same principles as that established by the UK Government (DETR, 2000) in their recent suit of policy directives that address an urban renaissance. The study adopts a set of both quantitative and qualitative procedures that follow 4 basic steps in the assessment of urban housing densification in targeted localities and included:

- identification of both the survey approach and potential capacity sources.
- survey of the unconstrained capacity.
- assessment of the unconstrained capacity.
- qualification of unconstrained capacity to give an assessment of realisable capacity.

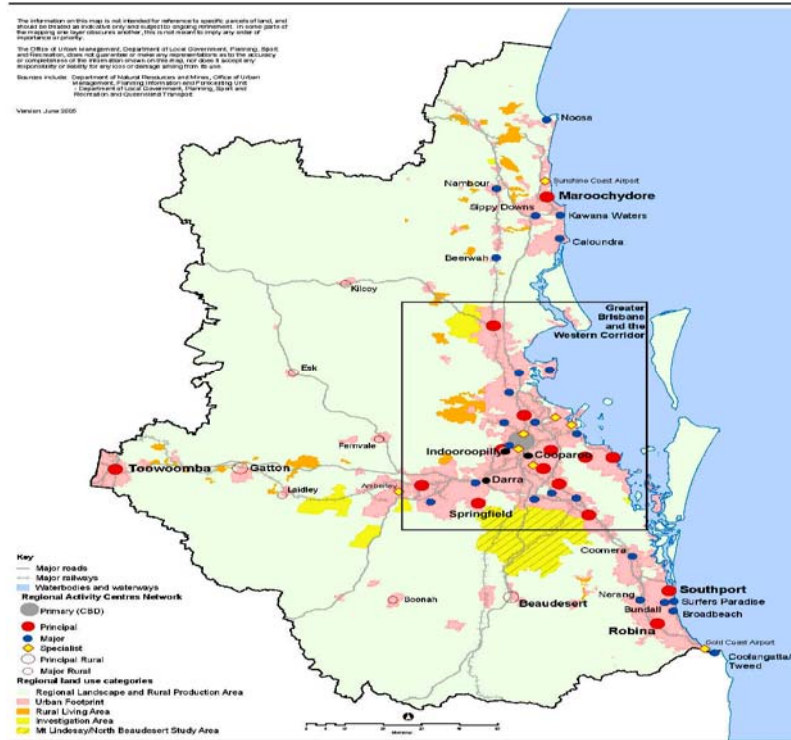
By documenting the variety of assumptions and outcomes necessary in order to realise increased urban housing densities, the UHCT offered insights to possible limits to growth in SEQ and suitable policy responses.

## Localities and Sources

Each of the three localities used in the pilot study was selected on the basis that they offer a different temporal sequencing, but also as each is considered in the regional plan to offer scope for transit oriented development (TOD) opportunities (see Figure 5.1). Densification policies which may influence transit choice should, ideally provide greater opportunity to reduce car dependency (Snellen et al., 1998; Yigitcanlar et al., 2005). The implication of a focus on TODs for this research is some consideration of a range of uses beyond residential in order to catalyse each location's potential. In addition, each locality falls within the jurisdiction of a single authority, Brisbane City Council and its City Plan planning scheme, making the analysis of policy modifications relatively straightforward.

**Indooroopilly:** Situated in the inner west, the riverside suburb of Indooroopilly, located some 7 km south west of the Brisbane CBD, is considered to offer short-term scope for TOD opportunities (see Figure 5.2). The suburb accommodates some 9,912 people and has a buoyant commercial, secondary office, retail and entertainment sector (BCC, 2006a). The south east Queensland regional plan identifies Indooroopilly as a principal activity centre. Its proximity to the major activity centres of the CBD and the University of Queensland have promoted a recent surge in both population and supporting residential unit developments in close proximity to the rail and bus interchange facilities.

**Coorparoo:** Situated in the inner eastern suburbs, Coorparoo is only 4km from the Brisbane CBD and has easy access to the city via road and rail infrastructure (see Figure 5.3). The suburb is considered to offer medium-term TOD opportunities. The case study locality has recently been earmarked as a transit node on the eastern busway route, a high frequency bus-based public transport initiative of the Queensland State Government. The suburb benefits from the demand for near-city living and at the 2001 Census accommodated some 13,376 people (BCC, 2006b).

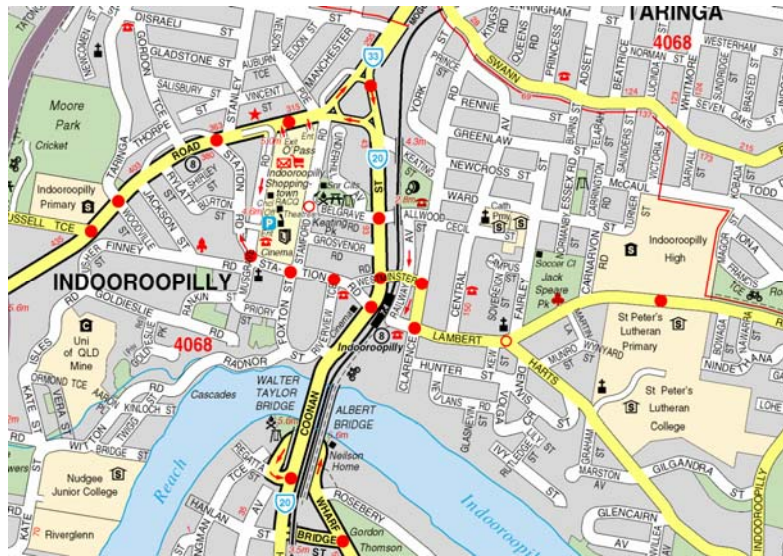
**Figure 5.1.** Urban Morphological Elements of the SEQ Regional Plan

Source: OUM (2005) South East Queensland Regional Plan 2005-2026

**Darra:** Darra is located approximately 15 km southwest of Brisbane and presents a long-term prospect for TOD opportunities (see Figure 5.4). The 2001 Census records the suburb as having a population of 3,698 people (BCC, 2006c). The suburb consists of a range of general and light industry land uses and a high percentage of older-style weatherboard homes built throughout the 1940/50s on quarter acre allotments.

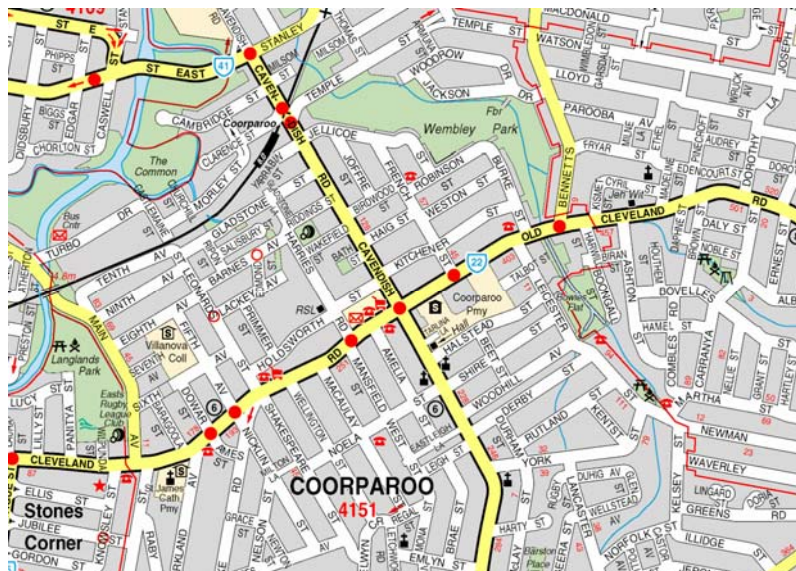


**Figure 5.2** Map of Indooroopilly Case Study Location

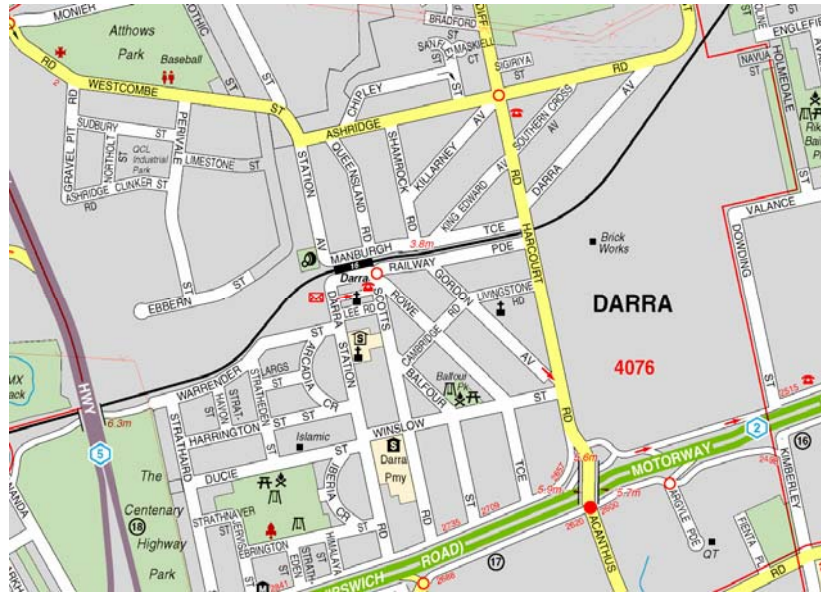


Source: UBD (2006) Brisbane UBD Street Directory on Disk.

**Figure 5.3.** Map of Coorparoo Case Study Location



Source: UBD (2006) Brisbane UBD Street Directory on Disk.

**Figure 5.4.** Map of Darra Case Study Location

Source: UBD (2006) Brisbane UBD Street Directory on Disk.

### Capacity Study Key Stages and Outcomes

The UHCT focuses on identifying land and buildings that can be more efficiently used for development purposes. In this study a priority area survey was undertaken, examining each and every site within a 400m radius of a public transit locus. This generally translates to a five minute pedestrian accessibility zone and offers high accessibility to a range of facilities and services.

For both Indooroopilly and Darra the centre of the 400 m radius is the rail station, whereas at Coorparoo the centre is located at the intersection between two arterial roads, referred to as Coorparoo Junction. The Coorparoo rail station is located 1 km north of Coorparoo Junction, at the heart of an area surrounded by general and light industry. It is realistic to assume then that Coorparoo Junction offers greater prospects for TOD development than the rail station. The recent announcement of the eastern busway route also cuts directly through the case study site, with three options still to be determined for a possible bus interchange facility to be located at the

heart of the case study site (Translink, 2007). The three separate options would directly impact sites three, four, seven and eight (see Figure 5.6) at Coorparoo, reducing their potential for residential development.

The focus of the case studies was on redevelopment opportunities, in the belief that these offer the greatest scope for increasing residential densities. The types of redevelopment opportunities assessed include redevelopment of existing land uses, redevelopment of car parks and previously-developed vacant and derelict land and buildings.

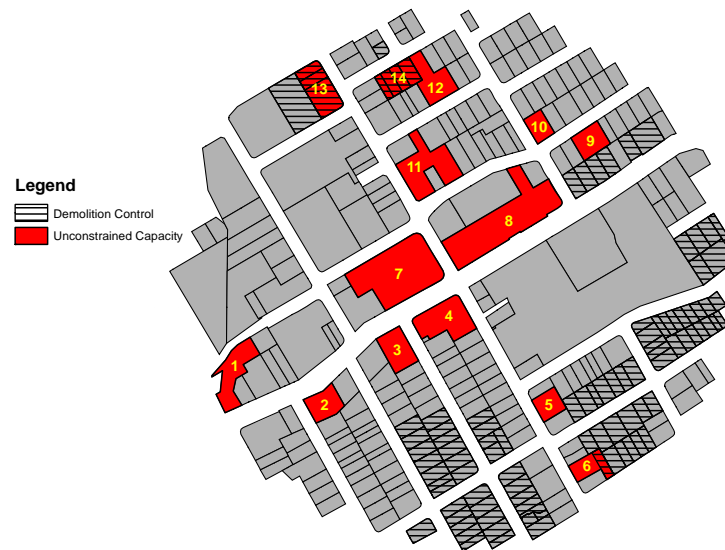
**Figure 5.5.** Indooroopilly Unconstrained Capacity



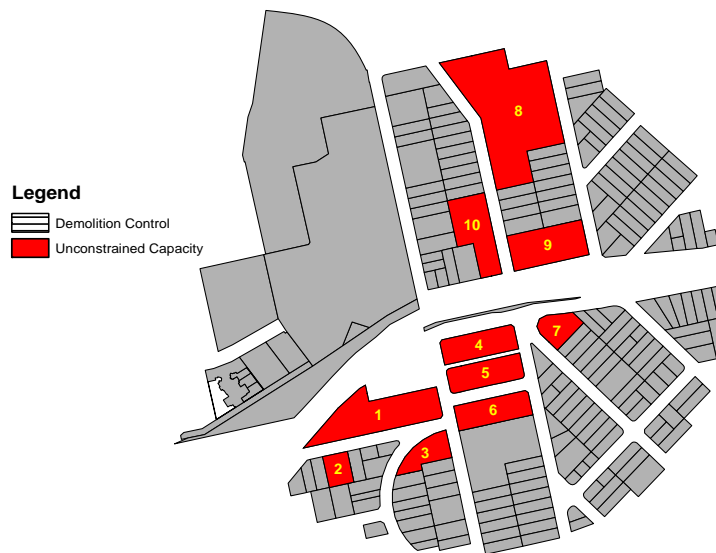
### Survey

The purpose of this stage of the exercise is to identify sites which offer an unconstrained (theoretical) potential for residential development over the 20 year period of the regional plan. This includes sites that may be recognised as possessing some form of constraint; thereby ensuring potential is not missed through early decisions to exclude sites from the study. The range of land use classifications identified as having unconstrained potential included multi-purpose categories (MP2, MP3 and MP4), allowing mixed use activity based on a scale hierarchy from MP2 down to MP4;

**Figure 5.6.** Coorparoo Unconstrained Capacity and City Plan Classification



**Figure 5.7.** Darra Unconstrained Capacity and City Plan Classification



low-medium residential (LMR); low density residential (LR); character residential (CR); general industry (GI); light industry (LI); community uses (CU); parks (PK) and sport and recreation (SR).

The basis of the criteria for inclusion in the unconstrained capacity includes evidence that a site is underused, inappropriate in its current use and/or reasonably expected to be targeted for development (SEERA, 2004). The processes for identifying these criteria are a ground truthing survey to ascertain the age, condition, dwelling number and storeys for each allotment and a desk based survey which collated data on allotment size, land use classification (based on BCC's City Plan information), land-holding typology (categorized as private individual, private company, corporate entity, local government, state government, commonwealth government and taken from the software package *RP Data*).

Having recorded the data for each of the above fields, cross tabulations between the fields reveal possible sources which appear to be underused, inappropriate in their current use and could reasonably be expected to be targeted for development. Table 5.2 and Figures 5.5, 5.6 and 5.7 reveal the combined data for the three case study localities collated at the survey stage of the study. The data reveals that some 170 potential allotments on 48 separate sites have been identified with unconstrained capacity, totalling 215 hectares, but also having some 199 existing dwellings.

**Table 5.2.** Unconstrained Capacity for Case Study Localities

|               | No.<br>of lots | No.<br>of Sites | Total<br>Area m <sup>2</sup> | Existing<br>dwellings |
|---------------|----------------|-----------------|------------------------------|-----------------------|
| Indooroopilly | 70             | 24              | 90,075                       | 111                   |
| Coorparoo     | 57             | 14              | 54,924                       | 68                    |
| Darra         | 43             | 10              | 70,026                       | 20                    |
| <b>Total</b>  | <b>170</b>     | <b>48</b>       | <b>215,025</b>               | <b>199</b>            |

### **Assessment**

The purpose of the assessment stage of the study was to explore the possibility to develop the identified opportunities more efficiently. A range of scenarios was considered to offer greater scope for consideration of increased densities.

In the assessment of capacity, figures are provided for potential development at a range of density multipliers and also at what can be currently achieved under BCC's City Plan regulations (BCC, 2006d). Each area

classification identified in the unconstrained capacity calculations employs a different maximum GFA/Plot Ratio which accords a measure of intensity and scale of development as shown in Table 5.3 below.

**Table 5.3.** City Plan GFA Calculations

| Area Classification                 | GFA/Plot Ratio<br>Maximum |
|-------------------------------------|---------------------------|
| MP2: Multi Purpose Centre 2         | 2.5                       |
| MP3: Multi Purpose Centre 3         | 1.5                       |
| MP4: Multi Purpose Centre 4         | 0.75                      |
| LMR: Low-medium Density Residential | 0.6                       |
| LR: Low Density Residential         | 0.3                       |
| CR: Character Residential           | 0.5                       |

Source: BCC (2006d)

Sites which have been identified as offering some capacity but currently not categorized in either the centres (the multi-purpose categories) or residential area classifications are given a nil value for potential capacity under the existing City Plan parameters. The area classifications which fall under this category include GI, LI, PK and SR. Whilst City Plan does not directly recognise the potential of such sites, this study employs density multipliers to these sites to reveal unconstrained capacity values.

The use of density multipliers offers a simple but practical way of dealing with a large number of sites and makes the assessment task manageable as figures can be produced quickly. Table 5.4 shows the unconstrained capacity figures for the three localities, comparing the City Plan figures with the density multiplier figures. The figures reveal that for Indooroopilly City Plan densities would allow more than 140du/h, largely due to the MP2 classification status. For Coorparoo the City Plan figures are just over those for 80du/h and the Darra figures unsurprisingly are less than 15du/h.

The figures in Table 5.4 represent the maximum capacity that could be theoretically achieved if no other factors need to be considered. But these sites are not totally free of constraints to their development and a further stage of qualification is necessary.

**Table 5.4.** Unconstrained Capacity at a Range of Densities

|                      | Existing dwellings | No. of unconstrained sites | No. of dwellings under City Plan | No. of dwellings @ 30du/h | No. of dwellings @ 80du/h | No. of dwellings @ 140du/h | No. of dwellings @ 200du/h |
|----------------------|--------------------|----------------------------|----------------------------------|---------------------------|---------------------------|----------------------------|----------------------------|
| Indooroopilly        | 111                | 24                         | 909                              | -                         | 510                       | 892                        | 1274                       |
| Coorparoo            | 68                 | 14                         | 392                              | -                         | 312                       | 546                        | 780                        |
| Darra                | 20                 | 10                         | 91                               | 204                       | 544                       | 951                        | 1359                       |
| <b>Totals</b>        | <b>199</b>         | <b>48</b>                  | <b>1392</b>                      | <b>204</b>                | <b>1366</b>               | <b>2389</b>                | <b>3413</b>                |
| <b>Net dwellings</b> | -                  | -                          | <b>1193</b>                      | <b>184</b>                | <b>1167</b>               | <b>2190</b>                | <b>3214</b>                |

**Qualification**

Any assessment of capacity needs to avoid a mere recording of the unconstrained capacity and thus develop a robust discounting evaluation to accord a measure of reality. Factors which might limit the realization of the unconstrained capacity within the time horizon need to be identified. This is clearly one of the more challenging stages of the assessment exercise. Discounting is an inherently judgmental process and thus it is important it takes place only once the unconstrained capacity has been identified.

At this stage informed qualitative judgments on those issues which may challenge the delivery of increased densities were provided by a range of stakeholders from government agencies, infrastructure providers and property and development representatives. Issues of infrastructure capability and provision, planning instrument flexibility, developer contributions, amenity provision, market viability and timing were considered in order to assess the possible constraints which might prevent a site moving from a theoretical to realizable capacity. Such issues have been identified as offering significant constraints to the delivery of infill housing in the literature (Breheny and Ross, 1998; Adams and Watkins, 2002; Golland and Blake, 2004; Searle 2004). Anecdotal evidence also suggests that there is limited appreciation of such constraints factored into metropolitan and local housing targets.

In this study interviews were conducted with personnel from BCC's Infrastructure Coordination Unit, Queensland Transport, members of the Urban Development Institute of Australia and the Property Council of Australia. This stage of the research required the stakeholders to allocate each unconstrained site with a development probability (probable, marginal and unlikely), realisable time frames (2006-2011, 2011-16 and 2016-2026) and suitable density of development. The suitable density of development or



realisable capacity is based upon maximising the potential of the site for residential development but taking into account location, individual site constraints, mixed-use potential and area classification. This meant that at several sites the density of development was not at the highest rate of 200du/h.

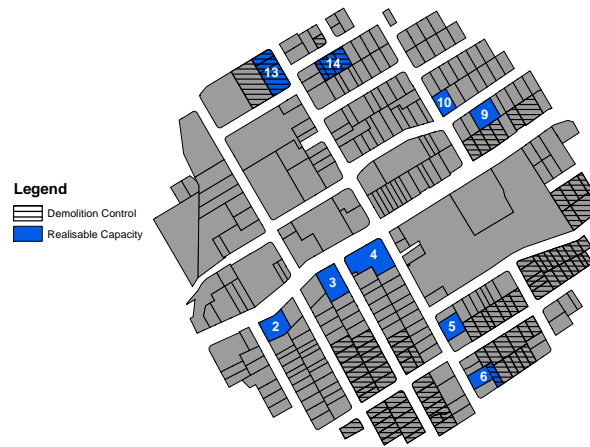
For the purpose of this study realisable capacity includes those sites with a probable or marginal development potential, with a time frame that includes both short-term, 2006-2011 and medium-term, 2011-16. Sites which offer potential outside of this ten year timeframe were considered to have substantial constraints making their development unlikely prior to 2016 and classified as long-term. Table 5.5 provides an aggregated summary of the realisable capacity for the three case studies. Figures 5.8, 5.9 and 5.10 show the specific location of the sites with realisable capacity across the three case studies. Table 5.5 reveals that the net realisable capacity is almost 100 per cent greater than under the existing City Plan regulations for the three case studies under investigation. This finding is remarkably similar to the detailed assessments of increased densities and reduced parking standards by Llewellyn-Davies in their studies of urban development sites across England (Llewellyn-Davies, 1996, 1998).

**Figure 5.8.** Realisable Capacity at Indooroopilly

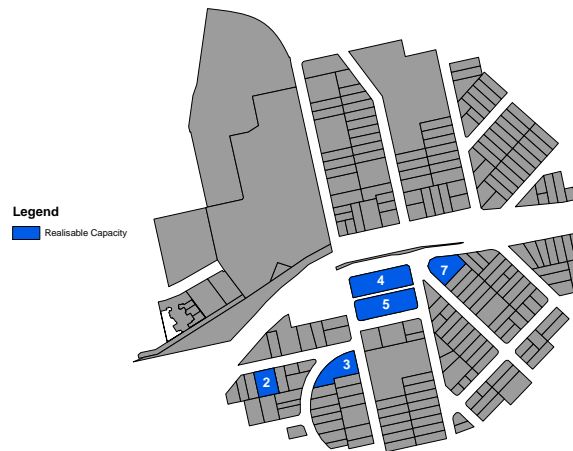




**Figure 5.9.** Realisable Capacity at Coorparoo



**Figure 5.10:** Realisable Capacity at Darra



**Table 5.5.** Net Realisable capacity

|               | Net Realisable Capacity 2006-2016 | Average annual contribution | No. sites in Realisable Capacity | Allowable capacity under City Plan: Net |
|---------------|-----------------------------------|-----------------------------|----------------------------------|---|
| Indooroopilly | 1068                              | 107                         | 21                               | 591                                     |
| Coorparoo     | 236                               | 24                          | 9                                | 95                                      |
| Darra         | 101                               | 10                          | 5                                | 46                                      |
| <b>Totals</b> | <b>1405</b>                       | <b>141</b>                  | <b>35</b>                        | <b>732</b>                              |

Each locality has similar types of constraints that include issues of current area classification, the fragmented nature of opportunities, multiple ownerships, existing, older multi-unit developments, heritage and demolition control constraints, severance caused by existing road and rail corridors, infrastructure supply constraints, developer contributions to amenity and infrastructure improvements, market viability and local community opposition.

**Indooroopilly:** Indooroopilly's designation as a principal activity centre and the supporting MP2 classification is seen as a positive contributing factor to realising some of the potential identified in the survey and assessment stages of the study. The plot ratio figure of 2.5 for MP2 allocated sites affords a significant opportunity to realising development opportunities, both residential and non-residential. In recent years several multi-unit developments have emerged in the western precinct of Indooroopilly, but most have only a very small element of non-residential development. If Indooroopilly is to be successful as a TOD it will need to attract a range of land uses to support residential development, including employment generating opportunities.

Community concerns over increasing residential densities in Indooroopilly were identified by most of the respondents as a significant constraint. This was emphasised more strongly in the eastern precinct of the locality, where there is a high percentage of demolition control and character residential designation and where recent proposals for multi-unit developments have met with significant community opposition.

Following interviews with stakeholders market factors are identified to be particularly important in influencing levels of development in Indooroopilly. Market viability is linked to the range of constraints identified in this section, but is conditioned largely by financial returns and the costs

incurred in both securing fragmented sites and constructing developments on infill sites.

**Coorparoo:** Coorparoo was identified at the outset of this study as offering medium-term potential as a TOD. However, the findings of the qualification stage of this study call in to question the scope of Coorparoo for medium-term development due to a range of significant constraints, including the size of allotments, number of ownerships, current commercial values, the possible location of the eastern busway interchange facility and severance caused by the principal roads.

Much of the existing development at Coorparoo Junction consists of single and two-storey retail and a small element of office development. Based upon the City Plan designation of MP3 a great deal of this development is currently underutilised for a range of residential and non-residential land uses. However, several of the respondents raised the issue of sewer and surface water provision in the Coorparoo suburb. Particular problems highlighted included the low lying nature of the suburb and its susceptibility to flooding and possible need to address this via flood storage outside the TOD area. At this stage the potential cost implications for developers remain uncertain.

The higher ranges of density multipliers were also considered to offer potential problems in terms of sewer capacity. Significant density increases would mean major increases on the sewer load and its transfer north across the Brisbane River to the S1 main sewer system. The costs incurred in upgrading the capacity of the sewer system would be substantial (not to mention highly disruptive), as much of the connection to S1 goes under existing urbanized areas. The likelihood of developer contributions but uncertainty as to their sequencing would seriously affect the market viability of residential development in Coorparoo.

**Darra:** Darra was identified at the outset of this study as offering long-term potential as a TOD. The findings of the qualification stage of this study tend to support this supposition but also identify a number of short and medium-term development opportunities which could catalyse the types of changes necessary to realise the TOD potential and supporting higher residential densities.

Whilst the issue of infrastructure provision was raised by several respondents, this broadly translated to a lack of appreciation on the capacity

of sewer services to cope with any densification and possible future developer contributions.

The issue of market viability was once again identified as an issue by respondents, but in this instance it was primarily due to the potential of delivering a new, higher density product in an established low density housing market.

### **Market Ambiguities**

The continuing preference in SEQ for separate dwellings on land parcels in excess of 600m<sup>2</sup> and the development industry response to such has continued to have a major influence on urban structure and form, and thereby its sustainability (ABS, 2006 and Industry Commission, 1993).

The various types of physical constraint identified above have a direct impact upon market feasibility. The higher risks associated with overcoming the variable constraints of infill sites and lower profit margin potential are a significant discouragement to the development industry.

Retrofitting existing urban areas is a highly complex challenge. Beyond the fixed assets of buildings, open space and infrastructure; fixed attitudes tend to persist amongst the existing host community. More often than not these attitudes tend to be firmly rooted in NIMBYism and make developing at higher densities, on smaller, infill parcels difficult.

In addition, the lack of opportunities for land speculation, cost of retrofitting previously developed sites and necessity for new types of market product make infill development a second preference to the *stock in trade* low density dwellings of many greenfield, master planned developments (Gillen, 1998 and McDonald, 2006). In acknowledgement of such market ambiguities, the PCA (2005) claimed that the infill targets of the SEQ regional plan (see Table 5.1) are extremely ambitious.

### **Spatial governance modifications**

This section provides an outline of the forms of spatial governance intervention which might unlock development opportunities in the localities identified in this study. This section is neither an exhaustive list of all the possible mechanisms, nor a detailed assessment of the merits of new mechanisms. It is recognised that a successful TOD policy will demand inte-

gration between spatial and transport policies, but the primary concentration here is on the spatial component linked to increasing housing densities. It needs to be stressed that none of the locations in the empirical study were ever intended to be developed as TODs and their ad hoc development and land use frameworks provide a major challenge to their successful delivery as TODs as outlined in the SEQ regional plan.

Overcoming the variety of constraints identified in this study to catalyse development opportunities can be undertaken in a multitude of different ways, ranging from piecemeal planning and infrastructure actions under conventional governance arrangements to the employment of special purpose statutory agencies (SPSA). This latter mechanism has been successfully used for a range of urban development projects both across Australia and overseas (PCA, 2005). Perhaps the most relevant example to draw upon for this study is the Subiaco Redevelopment Authority.

The Subiaco Redevelopment Authority has been assembling land in Subiaco, Perth throughout the 1990s and up to today, consulting with the community and developing plans for the future development and transformation of some 80 hectares of derelict industrial land.

The designation of an SPSA to assist the delivery of TODs in SEQ has the potential advantage of significant governance powers in terms of comprehensive planning, compulsory acquisition and land assembly, delivering catalysing infrastructure projects and marketing TODs to possible investors (PCA, 2005). This mechanism might also more readily address the complex issue of employment generating land uses and the increasingly challenging matter of the integration between transport and land uses.

An alternative mechanism which might occur under the conventional governance and market arrangements includes a place focused approach. Effectively, this would involve a customised or specialised zoning framework with the development of new development codes. Here, TOD precincts would be designated the same status as local plans under BCC's City Plan and reclassifications employed to realise the types of land uses and densities associated with TODs. The new codes would see new regulations and a loosening of the constraints in TOD locations and thus be financially attractive for a range of development opportunities. Linked to this latter point is the issue of developer contributions for infrastructure upgrades. The prospect of value capture, hypothecating the land use benefits for additional investment in public transport enhancements should be one of the critical objectives of TOD. Such an arrangement would demand

new legislation to enforce, the reality however is that it is highly unlikely to occur as the Queensland treasury are not inclined towards hypothecating revenues. The initial prospects for delivering such mutual benefits do not seem to be a priority agenda in SEQ. Beyond planned rail station fit-outs, important though these are, there is little or no planned improvement in the transport infrastructure.

The use of enquiry by design processes may also prove to be a valuable exercise in overcoming community opposition to increased densities, new infrastructure and new land uses. This process provides a more communicative and creative approach to exploring the potential of TODs and can be employed via both conventional and changed governance mechanisms.

The following sections highlight the types of actions which might occur in the three case study localities under existing governance and market processes. Such actions, particularly land use reclassifications are unlikely however to overcome the fragmented nature of opportunities, size of sites and parcelling up of allotments. Indeed, they may even exacerbate constraints by raising the expectations of landowners. Carmona et al (2003, p48) maintain however that landowners' expectation of land value tends to be based upon recent market activity and on spatial development patterns which maximise return. The authors suggest that this may mean that land value expectations actually ignore spatial planning requirements, with the landowners holding out for the highest bid and the developer compromising the quality of the design and product to raise sufficient revenue to ensure a profit.

**Indooroopilly:** The study reveals that Indooroopilly has reasonable short-term and good medium-term opportunities for residential development. Its status as a TOD however is less certain. Whilst there is a secondary office market within Indooroopilly, there remains a short supply of employment generating land use. Site 11 at the rail station in Indooroopilly and Site eight on Station Road offer significant opportunities for employment generating land uses. Site eight is currently an MP2 designation that remains underutilised, whereas Site eleven, currently classified as LMR, may require a new reclassification to enable mixed use activities and suitably high densities for its central location.

Recent piecemeal developments within the MP2 area classification in the western precinct are almost exclusively residential with limited non-residential uses. This may need addressing via improved controls in the

area classification designations to deliver more employment opportunities, but will also need tight control on off-site car parking provisions.

**Coorparoo:** The study reveals a significant problem with Coorparoo in terms of the realisable potential of sites with multiple constraints. The locality suffers significantly from a lack of a visible and functional centre. Coorparoo Junction is effectively a busy vehicle thoroughfare which is an ill-fitting mixture of strip mall and big box retail experience. For the suburb to realise its potential as a TOD and see higher residential densities it might even require a refocussing of the retail and employment experience onto Holdsworth Road, demanding significant reclassifications to support mixed uses and higher densities one block north of Coorparoo Junction.

**Darra:** Perhaps the biggest concern at Darra is the immaturity of the market for higher densities. However 2kms to the north of the locality significant developments have shown that improving amenity will attract residents, in this instance into new small lot housing developments.

Current amenity values are low at Darra and this would need to be addressed via new MP4 reclassifications, mainly in the northern precinct. In addition, the densities associated with the current LR classification would also need revisiting close to the rail station with possible LMR reclassifications and similarly, poorly maintained and underused LI land uses very close to the rail station might be better allocated as LMR classifications.

## Conclusions

One of the key challenges facing all the metropolitan areas of Australia is how to accommodate future population and development growth. Randolph (2006) estimates that in Brisbane, Melbourne and Sydney alone, an extra 1.12 million new higher density dwellings will be constructed as infill developments over the next 30 years. As yet, however, a comprehensive understanding of the capacity of the existing urban footprint to accommodate future infill housing development is absent. This paper provides an insight in to the type of tool required to assess the suitability and potential of localities for increased densification, thereby enabling local authorities across Australia to set out how they may address local and metro-regional dwelling targets.

Originally developed for the purposes of informing local growth management strategies in SEQ, the UHCT has broader applications. The

UHCT can be used to inform urban managers outside of SEQ as to the processes and policy actions designed to enhance the feasibility of potential urban residential development sites. Indeed, beyond State and local government planning agencies, other users of the UHCT may include infrastructure providers and the real estate industry, to assess the direction of future infrastructure commitments and emerging market activity.

Whilst the principal aim of the UHCT is to assess housing capacity, the selection of areas with TOD potential in the piloting exercise meant that some consideration of a range of urban land uses was also necessary. The principal findings of the empirical testing suggest that TODs on their own are unlikely to deliver the level of development necessary to accommodate population growth over the life of the SEQ regional plan. It is clear that a range of development scenarios are necessary. However, TODs can play an important role (in terms of sustainable travel behaviour) but only with substantial changes to the existing regulatory controls. Whilst not the key focus of this study, it is recognised that any spatial regulatory modifications require commensurate changes to transport planning regulations and service coordination in order to improve the frequency, quality and reliability of public transport.

As stated at the outset of this paper the scale of the demographic challenge for urban Australia demands new tools. Muddling through is not an option. A review of current capacity assessment techniques is necessary. Anecdotal evidence suggests that they are largely based on quantitative measures and have limited appreciation of the multiple constraints that operate against the realisation of development at higher densities on infill sites. The UHCT developed in this project affords an opportunity for a qualitative assessment of the physical and market potential of a range of potential sites and allows the documentation of a variety of assumptions and outcomes necessary in order to realise increased urban housing densities. The UHCT provides the opportunity to deliver high quality data on the level and scope of infill development opportunities, providing clarity and coordination in the preferred urban management approaches of both higher and lower order spatial plans.

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## **6 Evaluating Transit-Oriented Development Using a Sustainability Framework: Lessons from Perth's Network City**

*John L. Renne*

Planners and urban designers across the globe are promoting transit-oriented development (TOD) to encourage sustainable precincts around public transport stations. TODs are compact, mixed-use developments that facilitate walking, bicycling, and use of public transport through its urban design. This chapter presents a method to evaluate the sustainability of TODs based on six aspects of outcomes, including 1. Travel Behaviour, 2. The Local Economy, 3. The Natural Environment, 4. The Built Environment, 5. The Social Environment, and 6. The Policy Context. Data were collected in five rail precincts across Perth, Western Australia. The major goal of the study was to determine which indicators were possible to collect and establish baseline data.

### **Introduction**

Transit-oriented development is gaining popularity as a tool to achieve sustainable development, particularly in Western Australia. *Hope for the Future: The Western Australian State Sustainability Strategy* (2003) discusses the need to manage urban and regional growth, revitalise declining centres and suburbs, and integrate land use with balanced transport to reduce automobile dependence. TOD seeks to accomplish these goals, creating compact, mixed-use, pedestrian-friendly precincts around major public transport stations. This chapter presents a tool to measure the outcomes of TOD using a sustainability framework.

Sustainable development seeks to create an urban environment which maximises economic development and social equity, whilst minimising negative externalities upon the natural environment (see Figure 6.1). From a land use and transport perspective, this means reducing automobile de-

pendence through mixed use and compact cities with an array of travel alternatives focused on walking, bicycling, and public transport (Newman and Kenworthy, 1999, Banister et al., 2006).

**Figure 6.1.** Theoretical Model of Sustainable Development

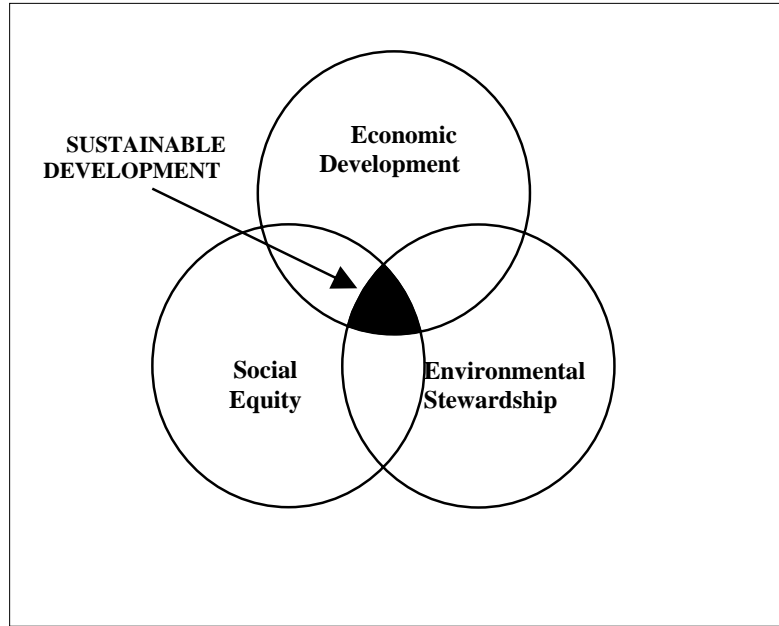
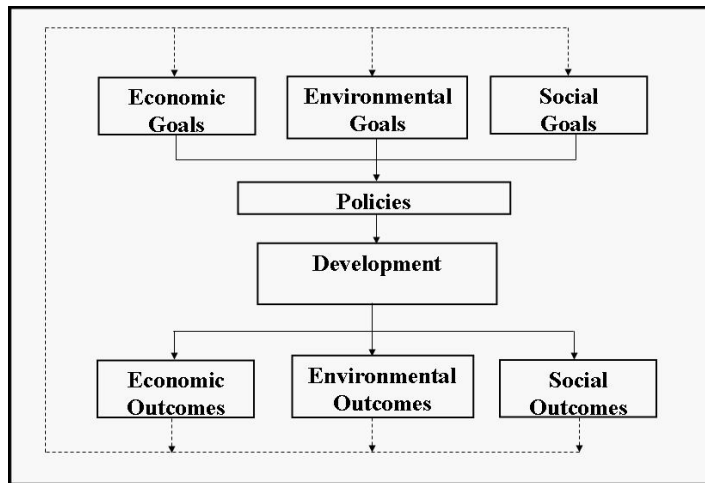


Figure 6.2 presents a framework which illustrates how sustainability is related to land use and transport policies and thus development outcomes. Inherent in all land use and transport policies are economic, environmental, and social goals. Policies take the form of land use and zoning regulations, parking requirements, design guidelines, and transportation system priorities. The policies shape the built environment leading to economic, environmental and social outcomes. The tool presented in this paper identifies indicators that can be used to measure outcomes so policy makers can continually monitor and update policies to foster more sustainable developments.

When instituting a system for measuring land use and transport outcomes, it becomes difficult to categorize indicators using the three basic categories of sustainable development (economic, environmental, and social) since many indicators cross boundaries. This method evaluates six aspects of TOD outcomes, including 1. Travel Behaviour, 2. The Local

Economy, 3. The Natural Environment, 4. The Built Environment, 5. The Social Environment, and 6. The Policy Context.

**Figure 6.2.** Framework for Evaluating Sustainable Development Policies



## Background

### *Measuring Success and TOD Outcomes*

Success is subjective. One TOD may yield a high transit mode share but lacks social diversity. Another might be deficient in shopping and entertainment choices but provides affordable housing on reclaimed brown-fields. Moreover, a myriad of goals for TOD obfuscates success. A recent study found that planners in Perth felt TOD was important towards increasing transit ridership, spurring economic development, increasing housing choice, relieving traffic congestion, reducing sprawl, creating a diverse community, improving neighbourhood quality, and increasing political support for transit (Renne, 2005a). With so many goals for TOD, measuring success becomes a matter of perspective.

The evaluation of TOD should be both cross-sectional and longitudinal. Indicators of performance can compare the TOD with regional and sub-regional averages, since TODs function as part of a larger whole. This approach is better than a matched-pair analysis, which is sometimes sug-

gested for comparing TODs to similar developments not built near a transit node. The problem with matched-pair analysis is that it is often impossible to find two developments that exhibit similar characteristics for comparison purposes and when a comparison is made it is usually only one or two-dimensional. After creating baseline data, future TOD outcome analyses should compare longitudinally to determine if a TOD is becoming more sustainable over time.

***A Focus on Travel Behaviour, Vehicle Ownership, Property Values, and Markets***

Past studies have focused mainly on just a few aspects of success – travel behaviour, vehicle ownership, property values and understanding markets. Several studies have looked at commuting in TODs. A 2003 study of TODs across California found that residents were up to five times more likely to commute via transit compared to non-TOD areas (Lund et al., 2004). In the San Francisco Bay Area, Cervero (1994) found that, “[o]n average, residents living near stations were five times as likely to commute by rail transit as the average worker living in the same city, and in some cases as much as seven times as likely” (Cervero, 1994, p. 177). Another study of 103 TODs across twelve regions in America found that, on average, residents were 2 – 2.5 times more likely to commute on transit compared to the average resident of the region (Renne, 2005b).

Studies which investigate non-commute trips in TODs have been less conclusive on travel behaviour impacts (Boarnet and Crane, 2001), although Chatman (2006) found that residents and employees near rail stations have a higher non-auto share of commuting and non-work travel. He attributed the effects based mainly upon the level of convenience (or inconvenience) in using an automobile. His study also found higher shares of non-auto use closer to job centres.

TOD households exhibit lower automobile ownership in comparison to regional averages. One study found that American households near train stations owned 0.9 cars per household compared to 1.6 cars per household across regions (Center for Transit-Oriented Development, 2004). My study of 103 TODs found that 37 percent of TOD households owned two or more cars compared to 55 percent of regional households (Renne, 2005b).

In looking at property value, a number of hedonic price studies found a premium on land value closer to rail stations (Cervero et al., 2004, Califor-



nia Department of Transportation, 2002b). A report published by the City of Cleveland summarizes a number of these studies (see Table 6.1). A study in the Santa Clara Valley of California found that commercial parcels located within a quarter mile of a light rail station was worth 24 percent more (an additional \$4.10 per s.f.) due to the station. Residential parcels experienced a 28 percent premium due to the station (an additional \$9.20 per s.f.) (Cervero and Duncan, 2002b, Cervero and Duncan, 2002a)

**Table 6.1.** Summary of Studies on Land Value Near Train Stations

| Location             | Increase in Property Value | Decrease in Property Value | No Effect in Property Value |
|----------------------|----------------------------|----------------------------|-----------------------------|
| Commuter/Rapid Rail  |                            |                            |                             |
| Commercial Property  | 4                          | 0                          | 1                           |
| Residential Property | 6                          | 0                          | 1                           |
| Light Rail           |                            |                            |                             |
| Commercial Property  | 2                          | 0                          | 0                           |
| Residential Property | 6                          | 1                          | 1                           |
| Total                | 18                         | 1                          | 3                           |

Source: City of Cleveland, 2001

Finally, some studies have looked at the market for TOD and necessary elements of local markets for a TOD to thrive. Huang (1996) studied the land-use impacts of rail systems on real estate development and concludes that “zoning incentives, attractive station sites with available land, and strong local economies are necessary for development to occur around transit stations” (p. 28). Bertolini contends that several factors have led to an increased number of station-area urban developments. This includes the expansion of high-speed rail systems across Europe and Asia and light rail systems across the United States, an increased process of the privatisation of railway companies, a decreased presence of manufacturing in cities, and the goal to make urban areas competitive to attract new residents (Bertolini, 2007).

The building of a new train line does not automatically yield TODs around stations. Loukaitou-Sideris and Banerjee (2000) examined why TOD failed to materialize along the Blue Line in Los Angeles, despite impressive growth in transit ridership. They propose eleven missing antecedents for economic development, including: 1. the corridor’s industrial ‘back-door’ location of Los Angeles, 2. missing density gradients near stations, 3. inaccessible stations, 4. pedestrian-unfriendly station locations, 5. lack of an urban design framework for station locations, 6. landscape dep-

ravation and the ‘broken window syndrome,’ 7. relatively high land costs, 8. antiquated zoning and regulatory barriers, 9. lack of institutional commitment, 10. absence of critical mass, and 11. lack of community involvement and participation (p. 119 – 122).

When a number of factors coexist, including a healthy local real estate market, community and institutional support, and transit and road network accessibility, changing demographics are supporting TODs. A number of studies indicate that the supply of transit accessible, mixed-use neighbourhoods is much lower than the demand to live in such locations (Levine and Inam, 2004, Center for Transit-Oriented Development, 2004, Urban Land Institute and PriceWaterhouseCoopers, 2005). Levine (2006) argues that zoning policies are artificially restricting smart growth developments, such as TODs.

*Transit Oriented Development in America: Experiences, Challenges, and Prospects* (Cervero et al., 2004) was the seminal report on TOD in the United States, sponsored by the Federal Transit Administration. This study, which reviewed the literature, surveyed and interviewed a number of stakeholder groups, and conducted case studies across ten regions concluded that “[t]he literature is replete with platitudes that have been heaped on the TOD concept; however, relatively few serious studies have been carried out that assign benefits to TOD in any quantitative or monetary sense. For the most part, anecdotes and story lines are relied on instead” (p. 119). The study went on to note that transit ridership impacts and land value gains were the areas with the most amount of quantitative research.

### ***Studies in Measuring TOD Success Holistically***

Some studies have attempted to study TOD success from a holistic vantage. The *Statewide Transit-Oriented Development Study: Factors for Success in California* (California Department of Transportation, 2002a, 2002b) reported on ten areas of major benefits, including: 1. TOD can provide mobility choices, 2. TOD can increase public safety, 3. TOD can increase transit ridership, 4. TOD can reduce rates of vehicle miles travelled (VMT), 5. TOD can increase households’ disposable income, 6. TOD reduces air pollution and energy consumption rates, 7. TOD can preserve resource lands and open space, 8. TOD can play a role in economic development, 9. TOD can decrease infrastructure costs, and 10. TOD can contribute to more affordable housing (pp. executive summary 4 – 6). In addition to providing data within the final reports which addresses each of these areas, the State of California also launched an online TOD Search-

able Database (<http://transitorienteddevelopment.dot.ca.gov/>). This database provides data about: land uses, mapping, implementation processes, financing, facilities, zoning, design features, pedestrian access, transit services, photos, travel benefits, local contacts, and other variables for 21 TODs across California. While the database is valuable, most of the data appear to date back to the early 2000s, thus the database is in need of an update.

Wells and Renne (2003) proposed a set of indicators to evaluate the success of the New Jersey Transit Village Initiative, a state program that facilitates TODs, otherwise known as Transit Villages. We recommended an evaluation framework based upon economic activity, environmental and transportation activity, institutional changes, and community perceptions using data most readily available for economic activity, travel behaviour, and public perception. Table 6.2 illustrates the indicators suggested for each of the categories. In attempt to collect the data, it was found that much of the data were missing and difficult to obtain. Subsequent efforts in working with local and state government in New Jersey met with some difficulty in collecting data as many of the variables were unavailable or only available in paper format located within municipal libraries. It became a time consuming effort to collect the data so designated Transit Villages were encouraged to collect and report data to the State for analysis by researchers at Rutgers University. This led to a series of reports as part of the Transit Village Monitoring Research program (available at: [http://www.policy.rutgers.edu/vtc/tod/tod\\_projects.html](http://www.policy.rutgers.edu/vtc/tod/tod_projects.html)).

Our findings in New Jersey prompted a national study, called *Transit-Oriented Development: Developing a Strategy to Measure Success* (2005) to determine what local, county, state departments of transportation and transit agencies across the United States reported as benefits and measures of TOD. Our study revealed 56 indicators, which we categorized as: travel behavior, economic performance, environmental performance, the built environment, and social benefits. Our findings revealed that that half of agencies surveyed had access to five or fewer indicators to measure these criteria. While we sought to determine which indicators were most useful and easiest indicators to collect (see Tables 6.3 & 6.4), the project did not include actual data collection for each of the indicators.

**Table 6.2.** Recommended Indicators to Evaluate TOD as Part of the Evaluation of the New Jersey Transit Village Initiative

| Economic Activity  | Environmental and Transportation Activity  | Institutional Changes  | Community Perception  |
|--|--|--|---|
| <b>Public Investment</b>   | <b>Pedestrian</b>  |  | <b>Residential Survey</b>   |
| <ul style="list-style-type: none"> <li>• Municipal funds</li> <li>• State funds               <ul style="list-style-type: none"> <li>◦ Grants</li> <li>◦ Loans</li> </ul> </li> <li>• Federal funds               <ul style="list-style-type: none"> <li>◦ Grants</li> <li>◦ Loans</li> </ul> </li> <li>• Tax abatements</li> <li>• Total public investment (calculated from indicators above)</li> </ul>  | <ul style="list-style-type: none"> <li>• Length of improved streetscape</li> <li>• Number of improved intersections/street crossings for pedestrian safety</li> <li>• Length of façade improvement</li> <li>• Pedestrian activity counts</li> </ul>  | <ul style="list-style-type: none"> <li>• New TOD ordinances</li> <li>• New TOD or smart growth designations</li> </ul> | <ul style="list-style-type: none"> <li>• How would you rate your town/neighborhood as a place to live?</li> <li>• Do you feel the downtown (or transit station area) is more or less attractive now compared to (number) years ago?</li> <li>• Is it more or less pleasant to walk around the downtown (or transit station area) now compared to (number) years ago?</li> <li>• Does the downtown (or transit station area) seem more or less safe now compared to (number) years ago?</li> <li>• Does the downtown (or transit station area) offer better or worse shopping now compared to (number) years ago?</li> <li>• Does the downtown (or transit station area) offer more or less restaurant options now compared to (number) years ago?</li> <li>• Does the downtown (or</li> </ul> |
| <b>Private Investment, Commercial</b> <ul style="list-style-type: none"> <li>• New or substantially rehabilitated retail/office space<sup>1</sup></li> <li>• Estimated private investment<sup>2</sup></li> <li>• Estimated new property taxes generated<sup>3</sup></li> </ul>   | <b>Parking</b> <ul style="list-style-type: none"> <li>• Number of new spaces for shoppers only</li> <li>• Number of new spaces for commuters only</li> <li>• Number of spaces that are shared</li> <li>• Number of new bicycle racks or lockers provided</li> </ul>  |  |   |
| <b>Private Investment, Residential</b> <ul style="list-style-type: none"> <li>• New or substantially rehabilitated housing units<sup>1</sup></li> <li>• Estimated private investment<sup>2</sup></li> <li>• Estimated new property taxes generated<sup>3</sup></li> <li>• Number of new studios / one bedroom</li> <li>• Number of new two bedrooms</li> <li>• Number of new three or more bedrooms</li> <li>• Number of new units for sale</li> <li>• Number of new units for rent</li> </ul> | <b>Traffic Flow</b> <ul style="list-style-type: none"> <li>• Number of new shuttle or jitney services provided to and from the transit station</li> <li>• Number of traffic control or flow improvements</li> </ul>  |  |   |
|  | <b>Land Use</b> <ul style="list-style-type: none"> <li>• Amount of brownfield properties remediated under a [Department of Environmental Protection] approved plan</li> <li>• Number/size of vacant buildings rehabilitated or replaced</li> <li>• Number/amount of underutilized/vacant lots reclaimed for</li> </ul> |  |   |

Source: Wells and Renne, 2003

**Table 6.3.** Indicators Rated Very Useful for TOD by at Least 50% of the Respondents

| Indicator   | Percentage as 'Very Useful' | Category                     |
|---|-----------------------------|------------------------------|
| Qualitative rating of streetscape (i.e., pedestrian orientation/human scale)                  | 77                          | Built environment            |
| Pedestrian activity counts  | 77                          | Travel behavior              |
| <b>Number of transit boardings</b>  | <b>70</b>                   | <b>Travel behavior</b>       |
| Population / housing density  | 67                          | Built environment            |
| Estimated increase in property value  | 63                          | Economic                     |
| Public perception (administered survey)   | 63                          | Social diversity / quality   |
| <b>Number of bus, ferry, shuttle, or jitney services connecting to transit station</b>        | <b>63</b>                   | <b>Travel behavior</b>       |
| <b>Number / square feet of mixed-use structures</b>   | <b>60</b>                   | <b>Built environment</b>     |
| <b>Number of improved intersections / street crossings for pedestrian safety</b>              | <b>60</b>                   | <b>Built environment</b>     |
| Estimated amount of private investment  | 57                          | Economic                     |
| Number of parking spaces for residents  | 53                          | Travel behavior              |
| Number of shared parking spaces   | 53                          | Travel behavior              |
| <b>Number of convenience/service retail establishments (i.e., dry cleaners, video rental)</b> | <b>53</b>                   | <b>Economic</b>              |
| Employment density (i.e., number of jobs per acre / square mile)                              | 53                          | Economic / built environment |
| Estimated amount of private investment by type of land use                                    | 52                          | Economic                     |

Note: Bold indicators were also reported as easy to collect

Source: Renne and Wells, 2005 p.19.

Our findings in New Jersey prompted a national study, called Transit-Oriented Development: Developing a Strategy to Measure Success (2005) to determine what local, county, state departments of transportation and transit agencies across the United States reported as benefits and measures of TOD. Our study revealed 56 indicators, which we categorized as: travel behavior, economic performance, environmental performance, the built environment, and social benefits. Our findings revealed that that half of agencies surveyed had access to five or fewer indicators to measure these criteria. While we sought to determine which indicators were most useful and easiest indicators to collect (see Tables 6.3 & 6.4) the project did not include actual data collection for each of the indicators.

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We recommended the following indicators as the most essential for a TOD evaluation framework: 1. transit ridership, 2. population and housing density, 3. quality of streetscape design, 4. quantity of mixed-use structures, 5. pedestrian activity and pedestrian safety, 6. increase in property value/tax revenue, 7. public perception—resident and merchant surveys, 8. mode connections at the transit station, 9. parking configuration—for commuters, for residents, and shared parking.

## Methodology

This study was commissioned jointly by the State of Western Australia's Department for Planning and Infrastructure (DPI) and the Public Transport Authority (PTA). DPI and PTA are both members of a state TOD Committee. Other members of the TOD Committee include the Main Roads department, the East Perth Redevelopment Authority, the Midland Redevelopment Authority, the Department of Housing and Works, and the Western Australia Local Government Association. The TOD Committee coordinates and prioritizes capital infrastructure planning to encourage TOD. The Committee recently developed a TOD Assessment Tool, which helps in prioritizing when stations should receive capital investments. They work closely with local government and have ranked all stations with respect to partnership potential, strategic significance of location, potential for maximising transit ridership, development opportunities, and socio-economic benefits.

As the TOD Committee funnels state resources into creating TODs, they would like a way to track progress. This tool was commissioned to be flexible so progress could be measured across a variety of benefit types.

**Table 6.4.** Indicators of TOD Rated Very Easy to Collect by at Least 50% of the Respondents

| Indicator   | Percentage as 'Very Easy to Collect' | Category                 |
|---|--------------------------------------|--------------------------|
| <b>Number of bus, ferry, shuttle or jitney services connecting to transit station</b>         | <b>79</b>                            | <b>Travel behavior</b>   |
| Number of bicycle racks or lockers  | 72                                   | Travel behavior          |
| New or improved cultural/artistic institutions or establishments                              | 71                                   | Social diversity/quality |
| Mileage of bicycle lanes  | 71                                   | Travel behavior          |
| Amount of improved public park area / public space  | 68                                   | Built environment        |
| Number of subsidized housing units  | 64                                   | Economic                 |
| Number of neighborhood institutions (i.e., local clubs or organizations)                      | 64                                   | Social diversity/quality |
| Number/amount of underutilized lots reclaimed for construction or green/recreation space      | 63                                   | Built environment        |
| Number of parking spaces for commuters  | 62                                   | Travel behavior          |
| Number of traffic flow improvements (i.e., traffic-calming devices)                           | 61                                   | Travel behavior          |
| Number/acreage of brownfield properties remediated  | 61                                   | Built environment        |
| Number of affordable housings units   | 61                                   | Social diversity/quality |
| <b>Number of transit boardings</b>  | <b>61</b>                            | <b>Travel behavior</b>   |
| <b>Number of improved intersections / street crossings for pedestrian safety</b>              | <b>59</b>                            | <b>Built environment</b> |
| Number/size of vacant buildings rehabilitated or replaced                                     | 57                                   | Built environment        |
| Estimated amount of new property taxes generated  | 57                                   | Economic                 |
| Amount of crime   | 57                                   | Social diversity/quality |
| <b>Number of convenience/service retail establishments (i.e., dry cleaning, video rental)</b> | <b>57</b>                            | <b>Economic</b>          |
| Length of facade improvement  | 57                                   | Built environment        |
| <b>Number / square feet of mixed-use structures</b>   | <b>54</b>                            | <b>Built environment</b> |
| Length of improved streetscape  | 54                                   | Built environment        |
| Number of substantially rehabilitated housing units   | 50                                   | Economic                 |

Note: **Bold** indicators were also reported as most important to collect (Table 6.3)

Source: Renne and Wells, 2005, p. 20

The goal of the study was to develop a method for measuring the performance of TODs in Perth against selected economic, environmental, social, and other performance criteria, and to establish the structure for a database required to undertake on-going periodic performance measurement. Therefore, while collecting data was an important part of the study, the most important part of the project was to test which data were available for collection. Therefore, this study has established a baseline that future analyses can be measured against.

The scope of the project began by identifying five transit precincts for analysis. The selection team, which included researchers and planners from DPI and PTA sought to select five stations which were representative of the different types of stations across Perth. The five stations selected were: 1. Mosman Park – a relatively compact, mixed-use and mixed-income established suburb; 2. Subiaco – an awarding winning textbook TOD build in the early 2000s, which has been so successful that property values have priced out most working class residents; 3. Maylands – a working class suburb close to Downtown Perth with an underutilized mainstreet and commercial centre; 4. Joondalup – an awarding wining New Urbanist town built in the early 1990s, which some argue has not taken full advantage of the train station within the urban fabric; 5. Glendalough – a station surrounded by automobile-oriented land uses that is hostile towards pedestrians.

The next step was to identify appropriate data categories, indicators, and data sources. The project team then embarked on collecting the data, working with local and state government to collect as much secondary data as possible before a primary data collection effort. Since our data collection effort sought to identify performance within the approximate 800-meter station precinct, some of the secondary data sources did not allow for an analysis at such a small geographic scale.

Our primary data collection effort took the form of site visits and a TOD Household Survey. The site visits sought to collect indicators from field observation whereas the Household Survey aimed to collect data from households living within the study areas. 2,503 households were randomly selected across the study area. Because Joondalup only had 364 households within the station precinct, we selected all of these households. In the remaining precincts 535 households (534 households in Glendalough) were randomly selected and sent surveys. For each selected household a letter was mailed from the government stating that they were chosen to participate in a study and that they would soon be receiving a question-



naire that was important for the future of planning in Perth. The first round of questionnaires was mailed within a week after this initial letter. To generate the highest response rate possible, each packet contained an introductory letter, an eight page questionnaire, and a postcard to return separately to ensure complete anonymity for the responses. After two weeks, the households that did not return postcards were sent a second round of questionnaires.

In total, 332 surveys were returned as bad addresses resulting in 2,171 surveys sent to valid households. The Household Survey resulted in 848 completed questionnaires or a response rate of 39.1 percent of households with valid addresses. This response rate falls in line with another household TOD mail survey using a similar methodology. A household mail questionnaire of three TODs in New Jersey recently resulted in a response rate of 40 percent (Renne and Wells, 2003).

It is important to note the limitations of this study's methodology. Many of the indicators draw from secondary data sources; therefore the data may be biased based on the methodologies used within the original collection of data depending upon the source. As for the primary data collection, the TOD Household Survey may be biased similar to any mail survey. Those that have the strongest opinions are perhaps more likely to complete the questionnaire. Moreover, since we surveyed only households that live within 800 meters of a train station, the habits of the population might be skewed compared to the general population due to a self-selection process of living near a rail station. Despite these limitations, the collection of these data represent one of the first attempts to amass such a broad set of indicators to measure the success of TOD based on a sustainability framework. There is no doubt that problems within the data exist but this study's goal was more to test a method for measuring TOD success than to collect the data. The best way to test a methodology for measuring TOD success is to actually collect data, which serves as a baseline to track future growth.

## Results

The team identified indicators for six categories, including: 1. Travel Behaviour, 2. The Local Economy, 3. The Natural Environment, 4. The Built Environment, 5. The Social Environment, and 6. The Policy Context. This section presents the results of identifying and collecting indicators within

each category. While a number of indicators are reported as possible measures to track TOD success, for the sake of brevity, this section only presents the results of selected measures from a larger set of data collected.

### ***Travel Behaviour***

Table 6.5 lists the potential measures, indicators, and possible data sources for measuring travel behaviour of residents living in TODs, while Table 6.6 reports information collected from secondary data sources. Three cells pertaining to vehicle kilometres travelled (see reverse coloured cells) are identified because the data seems questionable. This data comes from the Perth and Regional Travel Survey (PARTS) which surveyed 14,651 households across the region. The percent of the sample living within the station area precincts ranged from a high of 0.54 percent (79 households) in Mosman Park to a low of 0.055 percent (8 households) in Joondalup. The questionable data could be due to the small sample size in these locations.

As discussed above, The TOD Household Survey provided a much larger sample across the station area precincts. The questionnaire asked residents how they use public transport (see Table 6.7), how long it takes them to walk to the nearest train station (see Table 6.8), how they travel for shopping and commute trips (Table 6.9). This data reveals that automobiles are used for roughly 70 percent of all shopping and commute trips. Of the remaining 30 percent, residents in these five station areas are more likely to use public transport for commuting and more likely to walk or ride a bike for shopping. The survey also collected the number of vehicles, bicycles, and licensed drivers within the household (results not reported here). We also asked a number of opinion questions related to transportation, as reported in Table 6.10.

**Table 6.5.** Potential Travel Behaviour Measures, Indicators, and Possible Data Sources<sup>1</sup>

| Measure                     | Indicator   | Possible Data Sources      |
|-----------------------------|---|----------------------------|
| Vehicle Use/<br>Modal Split | Vehicle kilometres travelled (VKT) per household                                  | Travelsmart, PARTS, Survey |
|                             | Number of trips per day, by mode, per household                                   | Travelsmart, PARTS, Survey |
|                             | Method of journey to work (residents)   | ABS, Survey                |
|                             | Method of journey to work (employees)   | ABS, Survey                |
|                             | Method of other journey (visitors)  | Survey                     |
| Trip Lengths                | Average daily commuting time and distance (residents)                             | Travelsmart, PARTS, Survey |
|                             | Average daily commuting time and distance (employees)                             | Travelsmart, PARTS, Survey |
| Transit Quality             | Number of high frequency, line haul and local public transport services available | PTA                        |
|                             | Integration of services both spatially and timetable                              | PTA, DPI                   |
| Vehicle Ownership           | Number of vehicles per household  | ABS                        |
| Pedestrian Accessibility    | Ped Shed  | DPI                        |

**Table 6.6.** Secondary Travel Behaviour Data

<sup>1</sup> Travelsmart – a State Government Program in Western Australia that works to reduce automobile dependence; PARTS – Perth and Regional Travel Survey; Survey – The household TOD survey conducted for this project; ABS – Australian Bureau of Statistics census data; PTA – Public Transport Authority; DPI – Department for Planning and Infrastructure

| TOD Performance Indicators   | Mosman Park Station | Town of Mosman Park | Subiaco Station | City of Subiaco | Maylands Station | City of Bayswater | Glendalough Station | City of Stirling | Joondalup Station | City of Joondalup | Perth Metro Area |
|--|---------------------|---------------------|-----------------|-----------------|------------------|-------------------|---------------------|------------------|-------------------|-------------------|------------------|
| Average VKT per household (per day)                                | 11.87               | 17.57               | 66.62           | 31.10           | 13.47            | 18.41             | 48.48               | 21.40            | 164.32            | 23.45             | 26.38            |
| <b>Mode Share of Daily Household Trips (all trips)</b>             |                     |                     |                 |                 |                  |                   |                     |                  |                   |                   |                  |
| % trips by private vehicle (driver or pass) inc truck, mbike, taxi | 68.91               | 80.52               | 79.39           | 75.34           | 74.49            | 86.21             | 91.02               | 86.18            | 92.68             | 85.80             | 83.88            |
| % trips by public transport (all modes)                            | 5.88                | 4.68                | 5.64            | 5.18            | 7.65             | 0.95              | 3.91                | 2.90             | 3.05              | 2.39              | 3.87             |
| % trips walking, cycling, other                                    | 25.21               | 14.81               | 16.16           | 19.49           | 17.86            | 10.12             | 4.69                | 10.85            | 3.96              | 11.75             | 12.17            |
| <b>Method of Journey to Work (residents)</b>                       |                     |                     |                 |                 |                  |                   |                     |                  |                   |                   |                  |
| % trips by private vehicle (driver or pass) inc truck, mbike, taxi | 63.16               | 32.00               | 78.87           | 74.30           | 78.26            | 87.50             | 95.24               | 88.95            | 90.00             | 89.30             | 86.51            |
| % trips by public transport (all modes)                            | 10.53               | 40.00               | 18.31           | 15.08           | 17.39            | 7.29              | 3.17                | 8.51             | 6.67              | 7.79              | 9.26             |
| % trips walking, cycling, other                                    | 10.53               | 28.00               | 2.82            | 10.61           | 4.35             | 5.21              | 1.59                | 2.54             | 3.33              | 2.91              | 4.23             |
| <b>Method of Journey to Work (employees)</b>                       |                     |                     |                 |                 |                  |                   |                     |                  |                   |                   |                  |
| % trips by private vehicle (driver or pass) inc truck, mbike, taxi | 64.29               | 80.00               | 82.93           | 78.11           | 66.67            | 87.50             | 91.89               | 89.19            | 91.18             | 89.86             | 86.51            |
| % trips by public transport (all modes)                            | 21.43               | 4.00                | 12.20           | 12.94           | 27.78            | 7.55              | 5.41                | 7.88             | 5.88              | 6.69              | 9.26             |
| % trips walking, cycling, other                                    | 14.29               | 16.00               | 4.88            | 8.96            | 5.56             | 4.69              | 2.70                | 2.75             | 2.94              | 3.23              | 4.21             |
| <b>Method of other Journey (visitors)</b>                          |                     |                     |                 |                 |                  |                   |                     |                  |                   |                   |                  |
| % trips by private vehicle (driver or pass) inc truck, mbike, taxi | 70.09               | 81.52               | 78.32           | 74.65           | 77.53            | 86.04             | 89.73               | 85.74            | 93.52             | 85.17             | 83.53            |
| % trips by public transport (all modes)                            | 4.02                | 4.08                | 4.07            | 4.54            | 3.93             | 3.08              | 3.78                | 2.29             | 2.73              | 1.87              | 3.10             |
| % trips walking, cycling, other                                    | 25.89               | 14.40               | 17.62           | 20.81           | 18.54            | 10.89             | 5.95                | 11.93            | 3.55              | 12.88             | 13.33            |
| Trip lengths (residents)   | 9.723               | 2.810               | 11.341          | 10.257          | 9.601            | 11.240            | 13.254              | 11.952           | 8.273             | 15.443            | 14.404           |
| Trip lengths (employees)   | 9.274               | 6.680               | 12.318          | 11.276          | 8.654            | 11.381            | 13.297              | 11.842           | 9.487             | 15.210            | 14.404           |
| Number of services available (train and bus) total services        | 256                 |                     | 632             |                 | 286              |                   | 502                 |                  | 700               |                   |                  |
| #trips, bus services not co-ordinated with trains                  | 76                  |                     | 132             |                 | 0                |                   | 0                   |                  | 0                 |                   |                  |
| #trips, bus services not serving station                           | 36                  |                     | 332             |                 | 122              |                   | 78                  |                  | 0                 |                   |                  |
| Number of vehicles per household                                   | 1.139               | 1.275               | 1.286           | 1.223           | 1.353            | 1.562             | 1.429               | 1.573            | 0.875             | 1.880             | 1.694            |
| Ped Shed (walkable catchment/total catchment)                      | 77%                 |                     | 67%             |                 | 67%              |                   | 67%                 |                  | 67%               |                   |                  |
| Passengers boarding (Average Weekday Boardings (AWB))              | 677                 |                     | 2504            |                 | 1418             |                   | 1791                |                  | 2444              |                   | 68416            |

Note: Data from multi secondary sources. Shaded cells represent questionable data.

**Table 6.7.** Frequency of Public Transport Usage from the TOD Household Survey

| How often do you use public transport such as bus or a train? | Percent |
|---|---------|
| 5 days per week or more                                       | 32.1    |
| 1 to 4 day(s) per week  | 25.1    |
| 1-3 day(s) per month  | 24.3    |
| Less Often  | 18.3    |
| Never   | 0.3     |
| N = 742   |         |

**Table 6.8.** Walking Distance to the Nearest Train Station from the TOD Household Survey

| Approximately how long does it take you to walk to nearest train station? | Percent |
|---|---------|
| Less than 5 minutes   | 19.7    |
| 5-10 minutes  | 61.0    |
| 10-20 minutes   | 17.0    |
| More than 20 minutes  | 1.9     |
| Don't know  | 0.4     |
| N = 839   |         |

**Table 6.9.** Mode Choice for Shopping and Commute Trips from the TOD Household Survey

| Mode                | Shopping Trips | Commute Trips – Survey Respondent | Commute Trips – Survey's Partner (if available) |
|---------------------|----------------|-----------------------------------|---|
|                     | (Percent)      |                                   |   |
| Automobile          | 69.5           | 63.5                              | 69.6  |
| Public Transport    | 3.6            | 22.5                              | 11.6  |
| Walk and Bicycle    | 24.7           | 5.7                               | 6.5   |
| Motorcycle and Taxi | 2.1            | 4.2                               | 5.7   |
|                     | N = 827        | N = 614                           | N = 352   |

**Table 6.10.** Transportation Opinion Questions from the TOD Household Survey

| Transportation Perception Question                                      | Strongly Disagree | Slightly Disagree | Neutral | Slightly Agree | Strongly Agree |
|---|-------------------|-------------------|---------|----------------|----------------|
|   | (Percent)         |                   |         |                |                |
| I feel safe walking around my neighbourhood at night                    | 7.8               | 17.2              | 18.5    | 34.2           | 22.1           |
| My neighbourhood is well served with public transport                   | 1.0               | 2.4               | 3.5     | 22.6           | 70.5           |
| Traffic is not a major issue in the area                                | 14.8              | 21.6              | 17.6    | 28.2           | 17.8           |
| The neighbourhood is easy to walk around                                | 1.8               | 4.1               | 7.2     | 33.5           | 53.3           |
| Footpaths are in good condition   | 4.3               | 9.9               | 13.8    | 34.4           | 37.7           |
| It is easy to cross the street  | 7.7               | 11.8              | 14.7    | 34.4           | 31.4           |
| I feel safe from traffic while walking                                  | 4.3               | 11.4              | 13.0    | 37.1           | 34.2           |
| Drivers give way to pedestrians crossing the road                       | 16.6              | 21.9              | 26.2    | 26.8           | 8.5            |
| I can easily walk to the train station from my house                    | 1.8               | 3.8               | 3.7     | 17.3           | 73.4           |
| Hills along the route area barrier to walking to the train station      | 57.2              | 16.7              | 14.5    | 6.0            | 5.5            |
| One of the main reasons I live here is to be close to the train station | 17.4              | 11.4              | 27.8    | 22.2           | 21.2           |

### ***The Local Economy***

The potential measures, indicators, and possible data sources for economic variables are reported in Table 6.11. The economic indicators focus on the range and success of local business, the amount, affordability, and tenure

of housing, property values, taxes, and percent of income spent on housing and transportation.

**Table 6.11.** Potential Local Economy Measures, Indicators, and Possible Data Sources

| Measure             | Indicator  | Possible Data Sources                          |
|---------------------|--|--|
| Range of Businesses | Number of retail, commercial and industrial businesses (possibly on GIS)           | DPI, Local Government                          |
|                     | Suitability of local retail for residents (Index of Retail Variation)              | DPI, Site Visit                                |
| Business Success    | Rate/ Number of vacant buildings/units (retail, commercial, industrial)            | REIWA, Site Visit, DPI                         |
|                     | Number of jobs in area (by, categories, FT/PT)                                     | DPI, ABS                                       |
|                     | Number of people in home-based employment  | Survey   |
| Range of Housing    | Number of residential units (houses/flats/apartments)                              | ABS, Local Government, DPI                     |
|                     | Number of rental and owner-occupied residences                                     | ABS, Local Government, DPI                     |
|                     | Number of affordable housing units (to be defined)<br>Range of 1, 2 and 3+ bedroom | ABS, Local Government, DHW, Real Estate Agents |
| Financial Base      | Property value (over time)   | Valuer General, REIWA, DPI                     |
|                     | Percentage of income spent on housing and transport                                | ABS, PARTS, Survey                             |
|                     | Taxes collected by local government (\$)   | Local Government                               |

Note: Survey – The household TOD survey conducted for this project; ABS – Australian Bureau of Statistics census data; PTA – Public Transport Authority; DPI – Department for Planning and Infrastructure, DHW – Department of Housing and Works; REIWA – Real Estate Institute of Western Australia

The number of jobs (by type) for each station area is presented in Table 6.12. The bulk of the jobs across the areas are in retail, office, services, health care, and entertainment. These are exactly the type of jobs that are compatible with TOD, as opposed to heavy industry jobs. Vacancy rates, reported by DPI are shown in Figure 6.3. DPI also reports the number of

vacant buildings, but the data reported here is based on floor space to capture both buildings that are totally and partially vacant.

**Table 6.12.** Number of Jobs, by Type, for Each Station Precinct

| Number of jobs in the area<br>(by type) | Station Area Precinct |         |               |                  |                |
|---|-----------------------|---------|---------------|------------------|----------------|
|   | Mosman<br>Park        | Subiaco | May-<br>lands | Glenda-<br>lough | Joonda-<br>lup |
| Primary/Rural                           | 988                   | 851     | 1,035         | 424              | 45             |
| Manufacturing/Processing/Fabrication    | 1,517                 | 1,661   | 2,401         | 2,448            | 249            |
| Storage/Distribution                    | 2,503                 | 2,279   | 3,428         | 2,251            | 233            |
| Service Industry                        | 1,003                 | 980     | 1,033         | 952              | 224            |
| Shop/Retail                             | 1,685                 | 3,464   | 3,066         | 1,664            | 2,220          |
| Other Retail                            | 2,443                 | 2,380   | 3,592         | 2,097            | 718            |
| Office/Business                         | 2,282                 | 5,029   | 3,207         | 3,593            | 1,581          |
| Health/Welfare/Community Services       | 2,368                 | 4,770   | 2,835         | 1,506            | 392            |
| Entertainment/Recreation/Culture        | 4,484                 | 4,777   | 5,890         | 2,728            | 578            |
| Utilities/Communications                | 4                     | 83      | 25            | 41               | 10             |
| Total                                   | 19,276                | 26,274  | 26,512        | 17,704           | 6,250          |

Source: Department for Planning and Infrastructure

Table 6.13 reports housing tenure for each station precinct and Figure 6.4 presents the weekly payment towards rent or mortgage. The average amount spent on petrol, based on the TOD Household Survey, was \$46.94 AUD per week, whereas the average spent on parking and public transport was \$14.44 AUD and \$14.39 AUD, respectively.

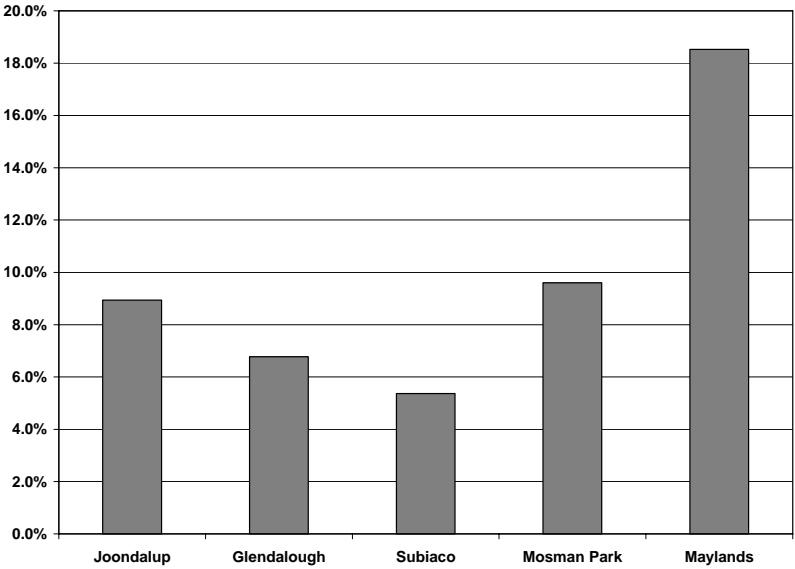
**Table 6.13.** Housing Tenure for Each Station Precinct

| Housing Tenure  | Station Area Precinct |         |          |                  |                |
|-----------------|-----------------------|---------|----------|------------------|----------------|
|                 | Mosman<br>Park        | Subiaco | Maylands | Glenda-<br>lough | Joonda-<br>lup |
| Fully Owned     | 32%                   | 26%     | 21%      | 23%              | 24%            |
| Being Purchased | 15%                   | 22%     | 21%      | 23%              | 8%             |
| Rented          | 45%                   | 42%     | 48%      | 45%              | 64%            |
| Other           | 8%                    | 10%     | 10%      | 9%               | 4%             |

Source: Australian Bureau of Statistics

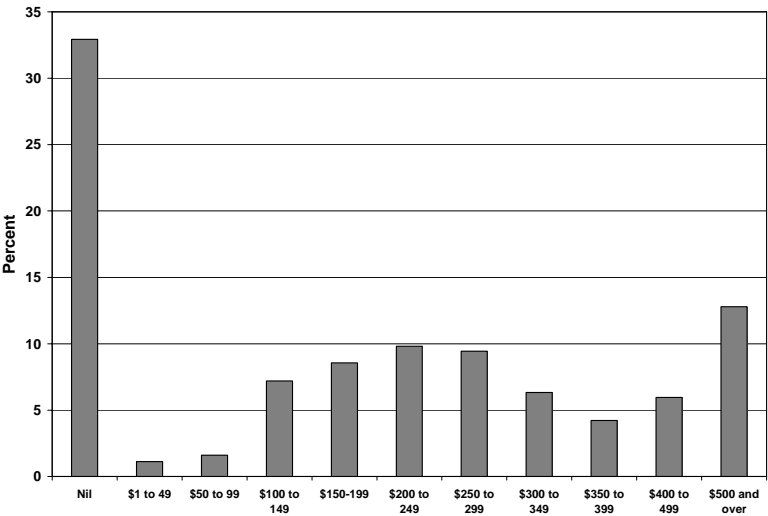


**Figure 6.3.** Vacancy Rate (Vacant Floorspace/Total Floorspace)



Source: Department for Planning and Infrastructure

**Figure 6.4.** Weekly Payments for Rent or Mortgage from TOD Household Survey



### ***The Natural and Built Environment***

An ideal TOD includes compact development and mixed land uses while still provided green and natural space. The potential measures, indicators and possible data source are listed in Table 6.14 and 6.15.

**Table 6.14.** Potential Natural Environment Measures, Indicators, and Possible Data Sources

| <b>Measure</b>            | <b>Indicator</b>                   | <b>Possible Data Sources</b> |
|---------------------------|------------------------------------|------------------------------|
| Air Quality and Pollution | Estimate emissions based on VKT    | Survey, PARTS, Travelsmart   |
| Energy use (people )      | Estimate car fuel use based on VKT | Survey, PARTS, Travelsmart   |
| Noise                     | Average and Peak noise levels      | Local Government             |
| Stormwater Retention      | Volume of water                    | Local Government             |

Note: Travelsmart – a State Government Program in Western Australia that works to reduce automobile dependence; PARTS – Perth and Regional Travel Survey; Survey – The household TOD survey conducted for this project

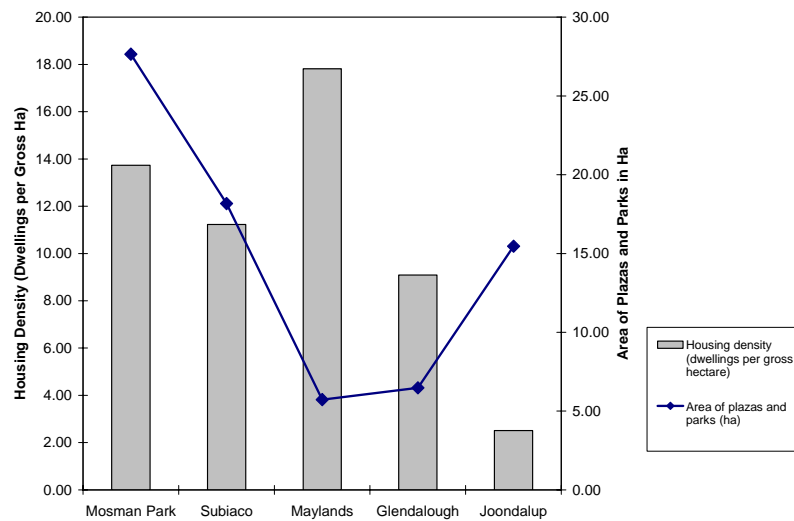
**Table 6.15.** Potential Built Environment Measures, Indicators, and Possible Data Sources

| Measure                           | Indicator  | Possible Data Sources               |
|-----------------------------------|--|-------------------------------------|
| Vibrancy                          | Resident population (density)  | DPI, ABS                            |
|                                   | Pedestrian counts  | Site visit                          |
|                                   | Area/number of vacant land parcels                                   | Site visit, Local Government, DPI   |
| Attractiveness                    | Subjective measure of façade quality                                 | Site visit, Survey                  |
|                                   | Subjective measure of streetscape quality (inc. pedestrian amenity)  | Site visit, Survey                  |
|                                   | Number of heritage buildings preserved                               | Local Govt, State Heritage Register |
|                                   | Public Art   | Site visit, Local Govt              |
| Safe and inviting area            | Quality of lighting  | Site visit                          |
|                                   | Security at railway station  | PTA                                 |
|                                   | Facilities (incl. retail) at railway station                         | DPI, PTA, Site visit                |
|                                   | CPTED (Crime Prevention Through Environmental Design)                |                                     |
|                                   | Building Frontages - SAFE assessment (measures to be determined)     |                                     |
| Mixture of uses                   | Number of mixed use buildings  | DPI, Local Govt., Site Visit        |
|                                   | Housing/Population density   | DPI, Local Govt., Site Visit, ABS   |
| Space for people rather than cars | Area of plazas and parks   | Local Govt., Site Visit, DPI        |
|                                   | Area/number of auto-oriented land uses                               | Local Govt., Site Visit             |
|                                   | Area/number of pedestrian-oriented land uses                         | Local Govt., Site Visit             |
|                                   | Bicycle parking spaces   | Site Visit, DPI                     |
|                                   | Bicycle traffic volume   | Site Visit                          |
|                                   | Presence of Principal Shared Paths (PSP) and on-street bicycle lanes | DPI                                 |
|                                   | Number of traffic calming features                                   | Local Govt., Site Visit             |
|                                   | Auto traffic speed and volume  | Main Roads, Local govt.             |

Note: Survey – The household TOD survey conducted for this project; ABS – Australian Bureau of Statistics census data; PTA – Public Transport Authority; DPI – Department for Planning and Infrastructure

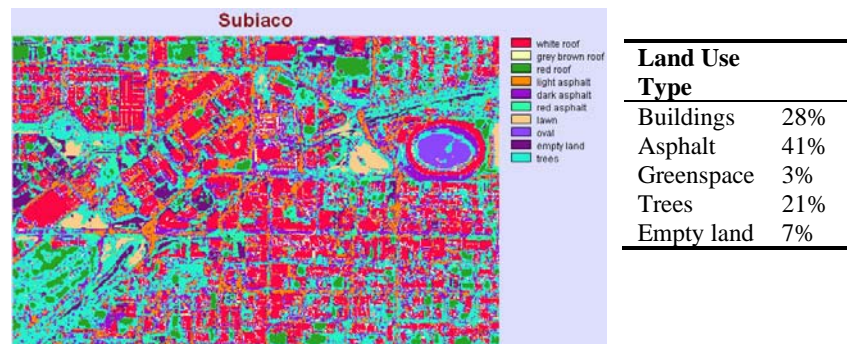
Figure 6.5 reports housing density and the amount of public space, which is a vital component for creating a successful built environment.

**Figure 6.5.** Housing Density and Area of Plazas and Parks



An analysis of land use by remote sensing depicts the amount and variety for different types of land uses (see Figures 6.6 – 6.10). Table 6.16 shows the comparison of land uses across the five station precincts.

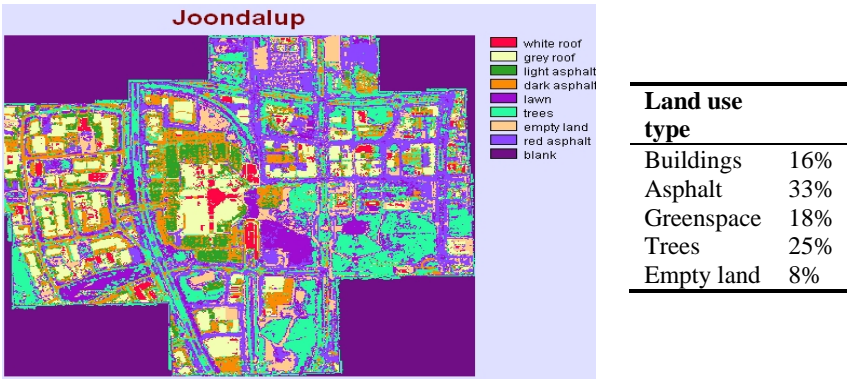
**Figure 6.6.** Land Uses Within the Subiaco Rail Precinct



Map Source: Map Created by Les Chandra

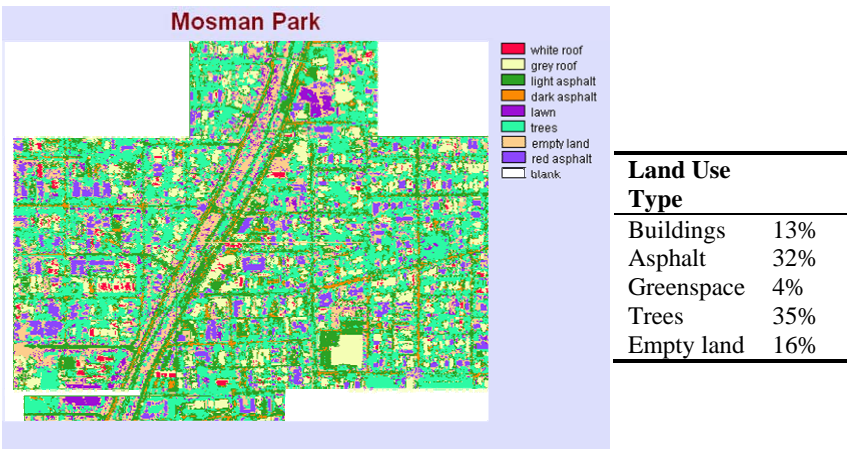
Table Source: Department for Planning and Infrastructure

Figure 6.7. Land Uses Within the Joondalup Rail Precinct

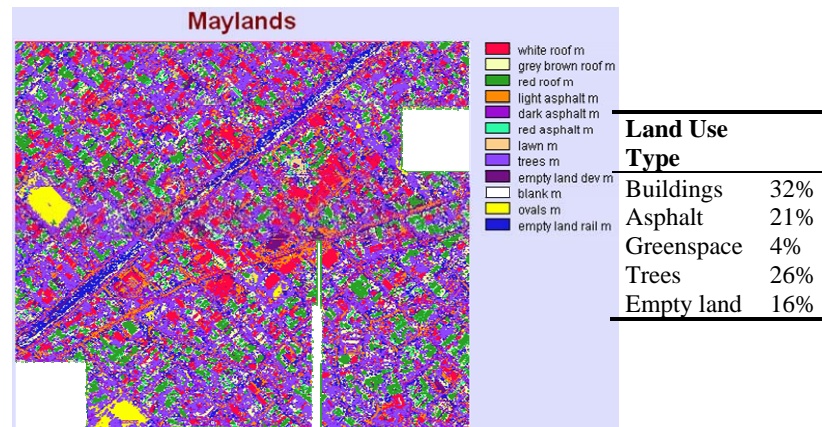


Map Source: Map Created by Les Chandra  
Table Source: Department for Planning and Infrastructure

Figure 6.8. Land Uses Within the Mosman Park Rail Precinct

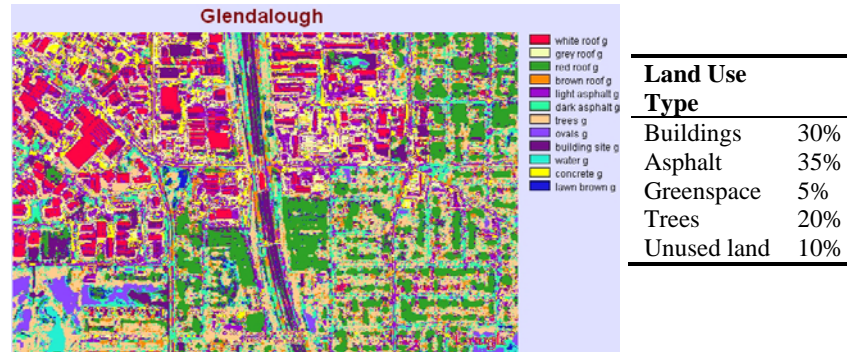


Map Source: Map Created by Les Chandra  
Table Source: Department for Planning and Infrastructure

**Figure 6.9.** Land Uses Within the Maylands Rail Precinct

Map Source: Map Created by Les Chandra

Table Source: Department for Planning and Infrastructure

**Figure 6.10.** Land Uses Within the Glendalough Rail Precinct

Map Source: Map Created by Les Chandra

Table Source: Department for Planning and Infrastructure

**Table 6.16.** Land Use Comparison Across Rail Station Precincts

|             | <b>Glenda-<br/>lough</b> | <b>Joonda-<br/>lup</b> | <b>Maylands</b> | <b>Mosman<br/>Park</b> | <b>Subiaco</b> |
|-------------|--------------------------|------------------------|-----------------|------------------------|----------------|
|             | (Percent)                |                        |                 |                        |                |
| Buildings   | 30                       | 16                     | 32              | 13                     | 28             |
| Asphalt     | 35                       | 33                     | 21              | 32                     | 41             |
| Greenspace  | 5                        | 18                     | 4               | 4                      | 3              |
| Trees       | 20                       | 25                     | 26              | 35                     | 21             |
| Unused land | 10                       | 8                      | 16              | 16                     | 7              |

Source: Department for Planning and Infrastructure

The TOD Household Survey also asked a number of detailed questions about the quality of the natural and built environment. Some of the data, including the quality of the footpaths, perceptions of safety, and other indicators related to transportation as it relates to the environments were reported in Table 6.10. Other data, which asked detailed questions about the respondent's ideal neighbourhood and the types of land uses that were important to them were asked on the questionnaire but not reported here for the sake of brevity.

## The Social Environment

Potential measures, indicators and possible data sources of the social environment are reported in Table 6.17. Figures 6.11 and 6.12 present data on educational attainment and income distribution of the population. Some of the data on safety and security were reported in Table 6.10. We also collected data on age and gender, as well as the perception of neighbourhood quality. Table 6.18 reports quality of life indicators collected thorough the TOD Household Survey.

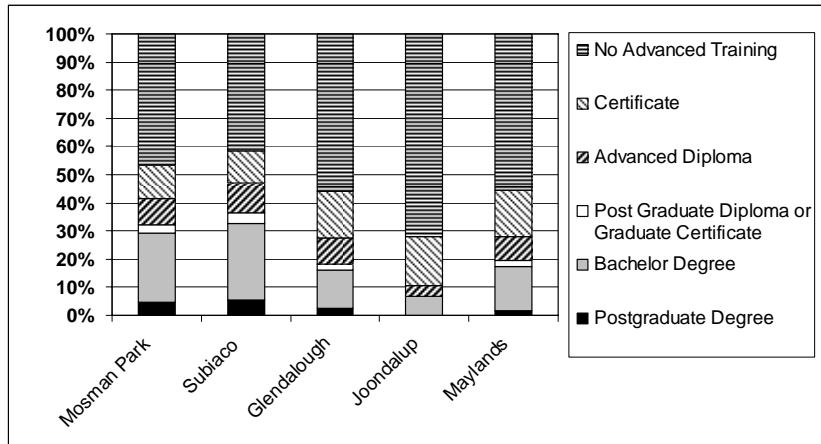
**Table 6.17.** Potential Social Environment Measures, Indicators, and Possible Data Sources

| Measure                       | Indicator  | Possible Data Sources  |
|-------------------------------|--|------------------------|
| Safety and Security           | Public perception of: neighbourhood, crime, pedestrian and bicycle safety                            | Survey                 |
|                               | Recorded incidents of crime, pedestrian and cycle accidents  | Police, Local Govt.    |
| Ownership                     | Public perception of community   | Survey                 |
|                               | Perceived quality of retail environment  | Survey                 |
|                               | Community support for further (re)development  | Survey                 |
| Residential diversity         | Breakdown of population by age, education, ethnicity and income level and household formation (size) | ABS                    |
| Opportunities for advancement | Number of libraries, theatres, galleries etc   | Site Visit, Local Govt |
|                               | Number of other community facilities   | Site Visit, Local Govt |
|                               | Perceived quality of community facilities  | Survey                 |
|                               | Number of festivals and events   | Local govt             |
|                               | Perceived quality of events  | Survey                 |
|                               | Educational Opportunities  | Site visit             |

Note: Survey – The household TOD survey conducted for this project; ABS – Australian Bureau of Statistics census data

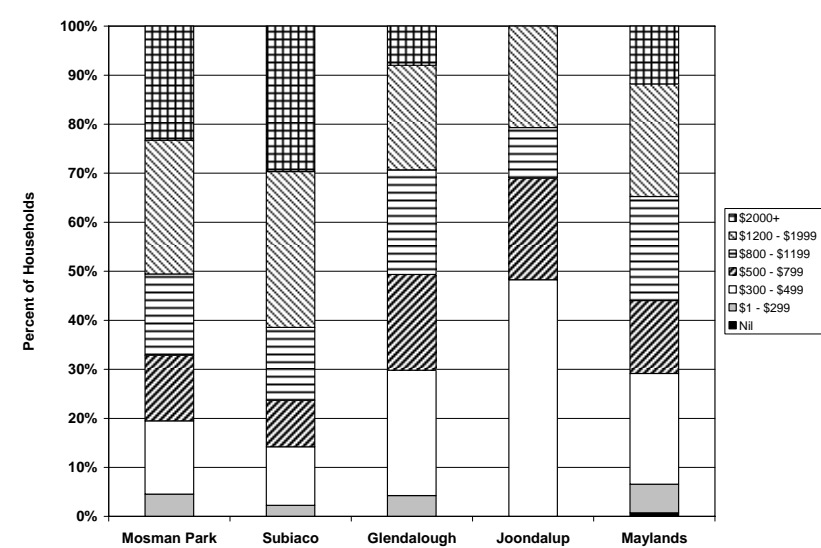


**Figure 6.11.** Educational Attainment of Residents Living Within the Rail Precincts



Source: Australian Bureau of Statistics

**Figure 6.12.** Weekly Income of Households Living Within the Rail Precincts



Source: Australian Bureau of Statistics

**Table 6.18.** Quality of Life Indicators from the TOD Household Survey

| Quality of Life<br>Perception Question                                 | Strongly<br>Disagree | Slightly<br>Disagree | Neutral | Slightly<br>Agree | Strongly<br>Agree |
|--|----------------------|----------------------|---------|-------------------|-------------------|
|  | (Percent)            |                      |         |                   |                   |
| My neighbourhood is a good place to live                               | 0.9                  | 2.1                  | 6.2     | 24.0              | 66.9              |
| My neighbourhood is a better place to live than other parts of Perth.  | 1.7                  | 2.6                  | 15.3    | 28.1              | 52.3              |
| My neighbourhood is clean and well maintained                          | 2.9                  | 7.3                  | 12.3    | 37.8              | 39.7              |
| My neighbourhood is a low crime area, compared to other parts of Perth | 3.3                  | 12.5                 | 28.1    | 34.4              | 21.6              |
| The neighbourhood centre is an attractive place that is nice to be in  | 4.6                  | 10.0                 | 21.6    | 30.1              | 33.6              |
| I can do all my weekly shopping in the neighbourhood centre            | 5.0                  | 8.4                  | 6.8     | 26.5              | 53.3              |
| I can do my day-to-day shopping in the neighbourhood centre            | 2.2                  | 4.1                  | 5.6     | 25.3              | 62.7              |
| There is a strong community feeling in my neighbourhood                | 6.0                  | 13.7                 | 35.8    | 29.8              | 14.7              |
| The area is quiet and free from traffic and other noise pollution      | 19.3                 | 24.4                 | 17.5    | 26.4              | 12.5              |
| The neighbourhood is well provided with community facilities           | 5.1                  | 8.9                  | 20.0    | 35.4              | 30.6              |
| There are many opportunities for recreation in my neighbourhood        | 4.5                  | 9.0                  | 18.0    | 33.9              | 34.6              |

***The Policy Context***

The locations selected in this study vary to a certain degree with respect to TOD potential. Glendalough is the most automobile dependent and is fairly built-out. The potential for changing Glendalough into a TOD is pretty low. Subiaco is a mostly completed TOD. It also has little room for

change. Other station precincts, such as Mayland, Mosman Park, and Joondalup may have more development potential. Of the five rail precincts, Joondalup and Subiaco were developed under heavy public institutional and financial support, however, Joondalup was not planned with a focus on the train station. Table 6.19 reports the public's support for future growth and development in the train station precinct.

**Table 6.19.** Public Support for Future Growth and Development from the TOD Household Survey

| Opinions on Future Development   | Strongly Oppose | Slightly Oppose | Neutral | Slightly support | Strongly support |
|--|-----------------|-----------------|---------|------------------|------------------|
|  | (Percent)       |                 |         |                  |                  |
| There should be more shopping/retail development in the train station precinct       | 11.8            | 12.1            | 26.7    | 23.2             | 26.2             |
| There should be more commercial/office development in the train station precinct     | 16.5            | 17.7            | 34.5    | 19.2             | 12.0             |
| There should be more flats/apartments/townhouses built in the train station precinct | 23.8            | 20.1            | 28.2    | 16.3             | 11.6             |

## Interpretation and Policy Recommendations

In recent years, TOD has been proposed as a means to encourage sustainable development. The problem is that few, if any studies have attempted to move beyond a discussion of sustainability to the collection and analysis of a holistic set of indicators measuring TOD success. This study attempts to provide indicators of TOD that use a sustainability framework, but the problem is that a multi-dimensional analysis, such as this, quickly becomes increasingly complex due to the vast number of indicators. Analyzing the data is difficult without having a particular objective or defined set of goals, but sustainable development calls for the simultaneous improvement of the economy, environment, and social arenas. Complex optimization models are possible to identify a possible solution space TOD sustainability, but can we expect neighbourhood groups and governments who operate within a political process to rely on such an analysis? In my opinion, the role of this type of analysis is to empower communities to make their

own decisions. This section suggests policy recommendations for using this sort of TOD outcome analysis and how it can inform policy.

1. *Understand that most decisions are ultimately political* – Planners need to understand that no matter how much data experts analyze, decisions are mostly made based on political factors. The importance of data is to confirm or reject assumptions that local communities make based on gut feelings. Data can assist to refine goals and objectives and ultimately create better policies to produce more sustainable outcomes (see Figure 6.2).
2. *Define the goals of TOD* – Each community needs to define their own goals for TOD. If multiple goals exist, they should be ranked. Some communities might encourage TOD primarily from a mobility perspective while others see it as a driver of economic development. Other communities might use TOD as a way to encourage location efficient affordable housing. Without specific prioritized goals for TOD, it becomes very difficult to define success.
3. *Establish baseline data across sustainability dimensions* – This paper attempts to create multiple dimensions to evaluate TOD success. Baseline data is needed to track future changes to ensure that goals are not achieved at the expense of some other unintended negative externality. Collecting data from both primary (ie. the TOD Household Survey) and secondary sources (ie. census) is often necessary. Secondary sources do not provide the coverage and scope of data needed to fully evaluate TOD from a sustainability perspective. It is also important to ensure that at least some of the data collected can be compared to regional or sub-regional averages.
4. *Collect data at regular intervals to track success* – Once the baseline data has been established, the only way to determine success is to collect the same data, using the same methodologies, at regular intervals. Change within the TOD could be compared to change within the region (or sub-region) to determine if the TOD is becoming more or less sustainable in comparison to the average.
5. *Analysis of data should include local and regional stakeholders* – A mechanism needs to be established for local and regional stakeholders to discuss and debate the outcomes of the analysis. Local planners need to seek the input of the community and regional planners need to work collaboratively across agencies and layers of government to ensure political coordination. The TOD Committee in Western Australia provides such a forum for Perth.

Again, the goal for this study was not to create the definitive methodology to measure TOD success using a sustainability framework. The goal was to start a dialogue. Future studies should analyze which indicators are best, how many are needed, and how to best analyze the data once it has been collected. The terms sustainable development and transit oriented development have become quite popular with planners across most urbanized areas, especially in Australia and North America. The problem is most studies focus too heavily on only one aspect of TOD success. This attempt admittedly has flaws as well, namely, what do you do when you have all of the data? How do you make decisions? Perhaps this tension is not so bad because it ensures that we are moving towards building cities based on a blend of political and data-driven analyses.

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## **7 Social, Economic and Environmental Impacts of Second Homes in Ireland**

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This chapter highlights a marked growth in the number of second and vacant homes in Ireland since the mid 1990s. These phenomena are linked to economic and population growth, the 'laissez faire' nature of land use planning in rural Ireland, the generous fiscal treatment of housing, as well as tax incentives to encourage house building in economically marginal areas. The social and economic impacts of these dwellings on individual localities vary, depending on their number, usage patterns and the nature of the local economy and housing market. However, their environmental consequences are largely negative as is their impact on the national economy and on the economies of those regions where vacant dwellings are concentrated. Our research questions the value of housing led rural development, as it can result in excessive output of vacant and second homes.

### **Introduction**

Until recently, second home numbers in the Republic of Ireland were low compared with the norm in western Europe. In 1991, second homes represented 1 percent of dwellings in Ireland, compared with 8 percent in the 15 longstanding members of the European Union (EU15) and 17 percent in the south of this region (Eurostat, 1996). This disjuncture has been linked to the lack of drivers for 'escape' as, until recently, Ireland was an agrarian society with low levels of urbanisation and one of the lowest population densities in Europe (Quinn, 2004). In addition, a protracted economic recession from the late 1970s to the early 1990s impeded the native population from investing in second homes, the market for which was dominated by foreign buyers during this period.

This situation has recently changed however. Census data indicates that by 2006 the number of holiday homes had increased to 3 per cent of the

dwelling stock, and the proportion of dwellings which are vacant increased to 18 per cent concurrently. While Ireland's second home rate remains modest by north western European standards, its vacancy rate is now close to the norm in southern European countries, such as Spain, Portugal and Italy, where the housing stock includes very high numbers of second homes (Norris and Shiels, 2004). Moreover detailed analysis of these data indicates that in 2006 91 percent of second homes in Ireland were in the largely rural and peripheral Border, Midwest, Southeast, Southwest and West regions. This distribution is in line with international norms whereby second homes are generally concentrated in rural regions of high landscape amenity value, where land or property is reasonably priced and available for purchase (Coppock, 1977; Gallent *et al*, 2005). Significantly, 73 per cent of dwellings categorized as permanently vacant in 2006 are located in the same peripheral regions, and most of the vacant housing in these regions is located in rural districts (72 per cent) or coastal districts (58 per cent) where second home ownership rates are high. This indicates that the number of second homes in Ireland is significantly higher than these census data suggest because a substantial proportion of dwellings classified as vacant are in fact second dwellings.

This expansion of second home ownership in Ireland reflects the increasing relevance of factors which have driven second home growth across Western Europe. These include new and more flexible forms of labour, the rising number of retirees with disposable time and income, cultural factors such as an idealised view of the countryside as a place of tradition and retreat, and utilitarian considerations such as investment potential; counter urbanisation, and the development of a post-productivist countryside, population growth in exporting urban regions and issues facing importing regions such as lower wages and house prices, economic decline and depopulation (Coppock, 1977; Halfacree, 1994; Hall and Muller, 2004; Gallent *et al*, 2005; Wallace *et al*, 2005; Ward, 1993). Some of the drivers of rising second home ownership in Greece, Spain, Italy and Portugal are particularly relevant in the Irish case (Allen *et al*, 2004). These include: late and weak industrialisation and late and rapid urbanisation; liberal land use planning regimes and housing policies which employ construction as a method of rural/regional development.

However, the particularly strong pace of recent growth in second home ownership in Ireland is also related to local factors, many of which stem from rising affluence during the 'Celtic Tiger' economic boom of the last decade. During this period, growth in GDP per capita in Ireland was the highest in the EU and rising disposable incomes, falling mortgage interest



rates and population growth fueled housing demand. Initially, the supply response was limited, resulting in significant increases in house prices, private sector rents and waiting lists for social housing (Norris and Winston, 2004). However, considerable strides were made in addressing this shortage, and in recent years new house building rates have been very high – three times the EU average in 2000 (Norris and Shiels, 2007a, 2007b). Compared to international norms, a relatively large proportion of this output took place outside urban areas – about one third of the current housing stock consists of single family dwellings in the open countryside – which both drove and was driven by the growth in second home ownership in recent years. This dispersed settlement growth reflects historical norms, and Ireland's distinctive land use planning tradition (McGrath, 1998). Gallent *et al* (2003) locate Ireland among the 'atomistic cultures, laissez-faire regimes' characterized by: informal regulatory systems and contraventions of planning law; prioritisation of the family over the state in welfare provision and housing production; ineffective statutory regulation of housing production; and an emphasis on private interests. In addition, a plethora of fiscal incentives for new housing development introduced since 2000 have increased output and encouraged construction outside population growth centres (Norris and Shiels, 2007a). Two of these measures – the Seaside Resorts Scheme (SRS) and the Rural Renewal Scheme (RRS) – played a particularly significant role in driving growth in second and vacant home numbers. Thus, prevalence of new construction in the stock of second homes distinguishes the Irish case from many other countries, where second homes tend to be purchased from the existing housing stock (Gallent, *et al*, 2003).

The growth in second home ownership in Ireland has been identified as an important issue by commentators, central government and by local councils responsible for those areas most affected. Despite this, the phenomenon has been subject to surprisingly little research. The research which has been conducted is overwhelmingly negative about their impact. Fitz Gerald (2005) argues that second homes have added to inflationary pressures in the housing market and Finnerty *et al* (2003) raise concerns about the negative environmental impacts of excessive holiday home development in certain localities. By contrast, the conclusions of the extensive research on this issue in other western European countries and of the Irish government's policy statements are more nuanced. Coppock (1977) views them as a product of broader social and economic changes affecting rural areas. Gallent *et al* (2005) argue that second homes are only a problem for locals in Europe if they are located in areas of land constraint and planning restrictions or if they contribute to a loss of local cultural or lin-

guistic traditions. The Irish environment ministry suggests that ‘holiday home development can act as a revitalizing force... particularly in remoter... areas’, but recognises that ‘an unstructured approach in some areas to such development has led to concerns’ (Department of the Environment, Heritage and Local Government, 2005: 5).

This chapter aims to address the dearth of research on second homes in Ireland by examining their impact on three high amenity rural areas, located in different parts of the country, all of which have high numbers of dwellings in this category. The next two sections of this chapter describe how the case study research methodology, the reasons for selecting these cases and their key characteristics. This is followed by a discussion of the social, economic and environmental impacts of second home developments in these areas. The conclusions to the chapter draw out the key findings of the preceding discussion and reflect on their regional, national and international implications.

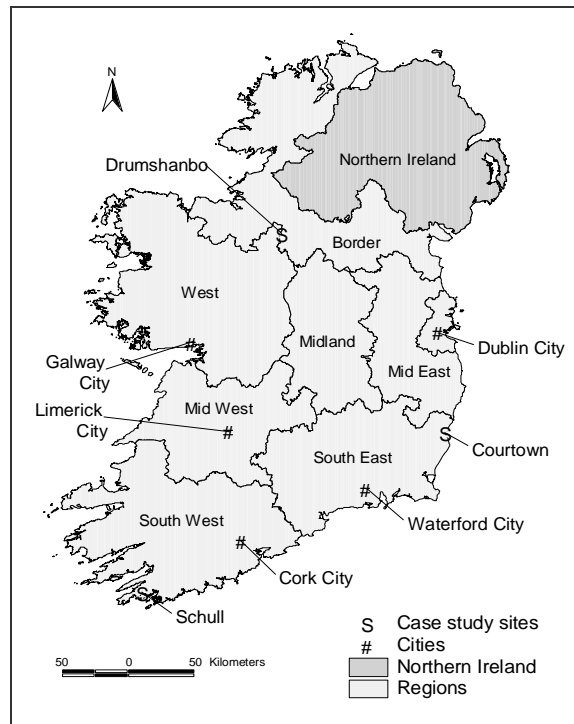
## **Research Methods**

Ireland is one of the few Western European countries which does not levy any ongoing taxes on housing or local government taxes on individual households. This creates challenges for researching second homes because such dwellings are difficult to identify. This analysis draws on the only available source of information - the data returned by the census enumerators since 1991 on empty dwellings for which a census form could not be completed, categorised as: ‘permanently or usually vacant’; ‘holiday homes’ and ‘temporarily vacant’. Using these data, trends in second home ownership in 1991 and 2006 were examined.

On the basis of this analysis and a number of other considerations, three districts were selected for case study research: Courtown, in County Wexford; Drumshanbo, County Leitrim; and Schull, County Cork (see Figure 7.1). Our case study research entailed an analysis of census data on each of these areas, existing research on second homes, official documents such as land use plans and ten in-depth interviews with key actors in each area (30 in total). Respondents included local authority land use planners, environmental engineers and councillors, estate and property letting agents, local business people, teachers, community activists, members of the clergy and police. Each respondent was informed that for the purpose of this study second homes are defined as a dwelling which is ‘the occasional res-

idence of a household that usually lives elsewhere and which is primarily used for recreation purposes' (Bielckus *et al*, 1972:9). The interviews focused on perceptions of the positive and negative impacts of second homes.

**Figure 7.1.** Irish Regions, Cities and Case Study Sites



The three cases were selected for examination because the counties where they are located all contain relatively high proportions of holiday homes (see Table 7.1), but they are also diverse in a number of important respects. They encompass a range of coastal (Courtown and Schull) and riverside (Drumshanbo) locations in three different regions of the country, are varying distances from major population centres and have different economic and demographic histories. Drumshanbo, and to a lesser extent Schull, suffered from sustained economic and population decline throughout most of the 20<sup>th</sup> Century, but this trend reversed from the mid 1990s. In Courtown, steady population growth has not been matched by economic

growth but rather driven by commuters working in Dublin (Meredith, 2006).

**Table 7.1.** Dwellings by Occupancy Status and Region in Ireland, 1991 and 2006

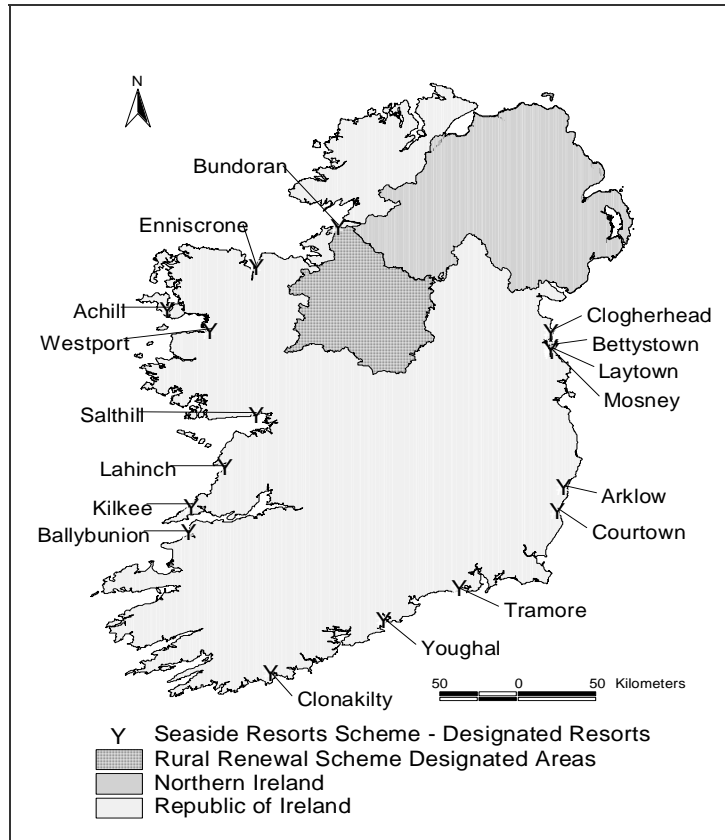
|                            | 1991             |           |                     |                      | 2006             |           |                     |                      |
|----------------------------|------------------|-----------|---------------------|----------------------|------------------|-----------|---------------------|----------------------|
|                            | House Holds<br>N | Dwellings |                     |                      | House Holds<br>N | Dwellings |                     |                      |
|                            |                  | N         | Perm<br>Vacant<br>% | Holiday<br>Home<br>% |                  | N         | Perm<br>Vacant<br>% | Holiday<br>Home<br>% |
| <b>Regions</b>             |                  |           |                     |                      |                  |           |                     |                      |
| Dublin                     | 311009           | 335978    | 4.6                 | 0.1                  | 420281           | 475088    | 11.0                | 0.1                  |
| Other Cities               | 80057            | 88449     | 6.6                 | 0.1                  | 105804           | 124303    | 12.9                | 0.2                  |
| Border                     | 117599           | 135195    | 12.8                | 2.4                  | 177058           | 224384    | 20.2                | 5.5                  |
| Mideast                    | 89828            | 97984     | 7.2                 | 0.8                  | 142499           | 162756    | 11.4                | 1.1                  |
| Midland                    | 57193            | 63783     | 9.4                 | 0.3                  | 85532            | 102832    | 15.9                | 0.8                  |
| Midwest                    | 73957            | 84556     | 11.6                | 1.6                  | 105872           | 127801    | 15.7                | 3.5                  |
| Southeast                  | 97374            | 108375    | 9.7                 | 1.8                  | 143293           | 173858    | 16.5                | 5.1                  |
| Southwest                  | 117085           | 137346    | 13.9                | 3.3                  | 171385           | 215028    | 19.1                | 5.8                  |
| West                       | 84982            | 99222     | 14.3                | 2.4                  | 117468           | 152514    | 22.1                | 5.3                  |
| <b>Case Study Counties</b> |                  |           |                     |                      |                  |           |                     |                      |
| Cork                       | 80922            | 93261     | 12.2                | 3.0                  | 123293           | 149730    | 16.6                | 4.4                  |
| Leitrim                    | 8252             | 10088     | 18.0                | 2.4                  | 10646            | 15196     | 29.4                | 7.8                  |
| Wexford                    | 28758            | 32436     | 11.4                | 4.0                  | 45567            | 58735     | 21.6                | 11.2                 |
| <b>State</b>               | 1029084          | 1150888   | 9.1                 | 1.3                  | 2938384          | 1758564   | 15.1                | 2.8                  |

Note: Dwellings refer to habitable dwellings. 'perm.' means permanently vacant, this category includes all those unoccupied inhabitable dwellings which are not categorised as temporarily vacant or holiday homes.

Source: Census data provided by the Central Statistics Office.

Furthermore, as Table 7.1 demonstrates, the pace of second home development in these counties has also varied, reflecting variations in characteristics of the tourist clientele and drivers of holiday home development. Schull traditionally attracted an up-market clientele and this district, and County Cork more broadly, had relatively high levels of holiday home ownership in 1991, which expanded only marginally by 2006. Courtown and Drumshanbo have traditionally attracted a very different tourist profile, families enjoying seaside caravan or chalet holidays and participants on fishing or boating holidays on the river Shannon respectively. Despite this, both experienced a dramatic increase in holiday homes between 1991 and 2006 – from 2 to 8 per cent in the latter case and 4 to 11 per cent in the former. Our research links these increases to the application of tax incentives for the construction and renovation of dwellings.

**Figure 7.2.** Areas Designated Under the Rural Renewal Scheme and the Seaside Resorts Scheme



As is detailed in Figure 7.2, the Rural Renewal Scheme applied to five counties in the north west of Ireland between 1998 and 2006, including Drumshanbo, while the Seaside Resorts Scheme operated between 1995 and 1999 and applied to Courtown and other designated resorts (see Figure 2) (Norris and Winston, 2004). The SRS provided tax incentives for building holiday homes which must be available for short-term letting during the summer (Revenue Commissioners, 2008). It resulted in the construction of 5,300 dwellings during its lifetime. However, SRS output in Courtown was especially high - 1,000 dwellings which constitutes 31.3 per cent of the town's housing stock - because here a particularly large area was designated under the SRS (Department of Tourism, Sport and Recreation,

1999). Assessing the influence of the RRS on second home rates is more challenging. Under this scheme tax relief is available only for dwellings intended for permanent occupation by owners or renters, so second homes are ineligible for support (Revenue Commissioners, 2008). However, all of the designated counties have very high vacancy rates and in many cases vacancy rates are higher in districts designated under the scheme than in adjacent non-designated areas. One review of the RRS found that 11,000 dwellings were built or refurbished under its auspices and that this ‘... very substantial increase in housing output has now resulted in excess supply’ (Goodbody Economic Consultants, 2005: iii). Given that RRS support is not available for holiday homes, this excess supply is likely to have resulted in permanently vacant dwellings. By contrast the relatively limited increase in holiday homes in Schull during this period may be explained by the fact that these area-based schemes did not apply there, although other nationwide tax incentives were utilised to subsidize the construction of clusters of holiday homes (holiday villages).

### **Impacts of Growing Second Homes Numbers in the Case Study Areas**

This research indicates that the extent and nature of the impacts of second homes varies significantly between the three case study sites. Broadly speaking, respondents in Schull gave the most positive assessment of second homes in their locality. In Drumshanbo and Courtown their impact is more problematic. Impacts are contingent on a variety of factors, among which four are most significant: the number of dwellings; usage patterns; the nature of the local planning system and housing market, particularly the availability of dwellings for permanent residents; and the nature of the local economy, particularly the existence of alternative sources of employment outside of construction and tourism. The character and import of these factors has varied over time and, as a consequence, so have the problems and advantages associated with second homes.

#### ***Economic Impacts***

The international research on second homes reveals both positive and negative economic impacts. There is evidence that second homes can contribute to regional economic growth by helping to maintain existing business and employment and contributing to entrepreneurial start-ups, a contribu-

tion which is especially valuable in declining regions. However, concerns have been raised about the sustainability of employment associated with second homes, which is concentrated in the construction phase, and their employment effects may be negligible when the expenditure associated with them is too low to enable specialisation in a second home market (Hall and Müller, 2004).

There was practically a universal recognition among interviewees of the important economic contribution from second homes, but especially in Schull and Drumshanbo where the local economy is weak and population decline has only recently reversed. One local authority councillor for Schull claimed:

There is four things that is keeping this peninsula alive (sic). There's the building industry... fishing... farming and... tourism... Fishing and farming are going through a major crisis and... there's rumours that [building] could go through a crisis too... So tourism is alive and we need to keep it alive.... So we would always be supportive of the second home, to a point, like....

Similarly, a community activist in Drumshanbo acknowledged that the recent spate of new residential development in the area has 'given a lot of money to local people and allowed them to expand their construction business and you have lads who started off as builders on say some second homes originally, now have their own business'. In fact there was a marked reluctance to criticise any potential source of employment, and one interviewee explained that 'people are afraid to open their mouths [to complain] in case they upset the people who are letting out the holiday homes'.

There was a consensus among interviewees that not all types of second homes are equally economically valuable and that the usefulness of this type of tourism may have declined in recent years. One interviewee in Schull argued that those holidaying on yachts and in caravans are the most economically valuable type of visitor because they tend to spend little time in their accommodation and more time in local pubs and restaurants. This echoed concerns often expressed in our research about the tendency for holiday home owners to bring all of their groceries with them and buy little in the local shops. Holiday home owners who moved to Schull for the whole summer 'where the mother stays and looks after the children and dad comes down at weekends' and holiday home which were let out to a number of different families for the duration of the summer, were viewed as economically useful because these dwellings are occupied long enough

to make a significant economic contribution. Fortunately, it was felt that a good number of second homes in Schull are in these two categories. Another interviewee suggested that 'The worst ones economically are the ones who own their [holiday] houses but only come for the two weeks'. In recent years the numbers in this category increased because 'people have five or six holidays a year' or they cannot be in Schull for long because both parents work full-time.

The particularly low economic value of long-term vacant dwellings was confirmed by interviewees from Drumshanbo. A local grocery shop owner argued that many of the RRS dwellings are in this category because they are either unsold or 'not furnished' which indicates that 'they're not available for rent'. He opined that most of the latter dwellings were 'bought by companies and individuals [from] larger cities... for tax breaks', who leave them vacant because they 'don't want to let them depreciate in value by letting someone in to live in them'. Other interviewees questioned whether there was sufficient demand for four and five bed private rented dwellings in rural Leitrim, which accounted for the majority of output under the RRS. Although there was a widespread welcome for the construction jobs generated by the scheme, concerns were expressed about the sustainability of these jobs and the region's over reliance on this type of employment. One community activist asked: 'What happens if the building slows down? We're very vulnerable in that area because I would have to say that 90 per cent of the economy in Leitrim is based on building'. Furthermore, several interviewees were concerned that excess housing output would destabilise the local housing market. For instance a business person from Drumshanbo suggested that when the RRS dwellings 'come back on the market again ... I feel there's going to be a glut of... second hand homes, that are going to be a bit hard to sell'.

Our research indicates that the economic benefits of the large number of holiday homes built under the SRS in Courtown were mixed. Most interviewees acknowledged that the availability of these new high-quality dwellings had increased tourist numbers with consequent economic benefits. However, they bemoaned the fact that this development was concomitant with the closure of several key items of tourist infrastructure. One businessman complained: 'I can see tourism dying out in Courtown and us just being a commuter town for Dublin. We're not a tourist village anymore. I mean we've lost two hotels and... the ballroom is gone'. This problem of centrifugal housing development, coupled with a declining resort centre was reported in several SRS resorts. A central government review of the scheme recognises that it was too broadly targeted at entire re-



sorts rather than at specific derelict districts within them and the incentives offered for upgrading existing facilities were insufficiently generous compared to those available for new build (Department of Tourism, Sport and Recreation, 1999). However, it suggests that the problem of inner area decline is also common in resorts not designated under the SRS. Our research points to more negative conclusions. In Courtown, the scheme precipitated both inner area decline and amenity loss. For example, the purchaser of a hotel let it become derelict while awaiting the results of a planning application for its demolition and replacement by SRS holiday apartments and a portion of local woods, popular with walkers, was cleared for holiday homes (see Mottiar and Quinn, 2003).

### **Social Impacts**

The international literature on second homes is broadly negative about their social impact. Two problems are especially prominent. Large numbers of second and vacant dwellings undermine community structures and a high demand for second homes drives up house prices and may create housing accessibility problems for locals, displacing households seeking principal residences (Cloke *et al* 1994; Hall and Muller, 2004; Gallent *et al*, 2005; Paris, 2006). Our research supports more mixed findings on this issue.

Regarding the implications of second homes for community structures, Schull revealed some positive effects. Interviewees reported that many of second home owners were relatively well integrated into the community, added a cosmopolitan dimension and were involved in community organisations, local churches and sponsoring local events. However, this outcome is related to the particular character of the second home owning population in Schull, which includes many long-term owners who have holidayed in the village for many years and families who stay for several weeks each year. A number of informants in Courtown reported high levels of participation in community events among older second home owners. However, there was a consensus that the speed and scale of recent housing development in the area had undermined community cohesiveness to the extent that: 'The local now is a stranger in his own village... The whole community is gone'. However, excessive development of primary as well as secondary residences were cited as contributors to this problem, and disentangling the contribution of these two factors is challenging and outside the scope of this study. In Drumshanbo the dominant view was that the development of second and long-term vacant homes has largely negative implications for community structures. One local resident com-

plained: 'Its hard to build a community when people aren't stable in the community, because they're not there a lot of the time.'

There was a practically universal consensus among the individuals interviewed for this research that second home development has driven up house prices in all three case study sites. This is supported by Fitz Gerald (2005) who estimates that second or vacant dwellings added between 15 and 20 per cent to house prices during 2000-2003, and significantly more to prices in those parts of the country such as the Border, Midwest, West, Southeast and Southwest where vacant dwellings are concentrated. However, whether house price inflation translated into housing affordability problems for local people is a less straightforward question. House price inflation creates particular problems in rural Ireland because of the lack of rented housing options, coupled with a marked preference for home ownership. In 2007, Cork County Council (2007) estimated that 57.9 per cent of local first-time buyers in the south coast area, including Schull, would have to devote more than one third of their net income to buy an average starter home (the official definition of housing unaffordability in the Planning and Development Act, 2000), compared with 42.8 per cent in the nearest city. On the other hand, the same data reveal worse affordability problems in the rural (and not heavily touristed) north of county Cork where vacancy rates are low. Many of the Schull respondents echoed Galent *et al's* (2005) view that second homes are only one of a number of factors which have precipitated rural population decline. One interviewee claimed: 'If you took every holiday home away or 90 per cent of them or whatever, they're not going to be replaced by long-term residents because there's no employment, there's no incentives for people to come and live in this area'. Furthermore, affordability problems were mitigated in each area by high housing supply and widespread self building and building on land donated by relatives. An interviewee from Drumshanbo summarised the financial attractions of the latter strategy as follows:

The locals, if they have a piece of ground, and even if [they pay] €40,000 to €50,000 for a site, you can still build a fine house for €200,000... whereas if you have to pay the developer and... the taxman his cut out of the action, then you're taking €300,000 or €350,000 to purchase a similar style house.

These monetary benefits, coupled with a cultural preference for living in the open countryside (Scott, 2006), meant that efforts by planning authorities to restrict housing development in the open countryside were met with fierce opposition in each case study area. Moreover, there was a common perception among local residents in each area that holiday home develop-

ers find it easier to secure planning permission than locals. This caused widespread resentment. A community activist in Drumshanbo claimed:

The secondary homes... that are built in groups seem to have no difficulty in planning. Primary homes are the ones, the single primary homes in particular, are having great difficulty where a son or daughter of the house is trying to build near the home place. ... there is a position in planning circles too, [against] this single house development in a rural area, which is unjustified in my view.

Our evidence indicates that the true picture is more complex however. On the one hand, refusal rates for one off rural housing planning applications have not risen significantly in these areas in recent years. Current central government guidelines on rural housing do not suggest that the construction of principal residences in the countryside should be curtailed and the development plans of the three relevant local authorities explicitly state that homes for permanent occupancy should be afforded preference in planning decisions (Cork County Council, 2007; Department of the Environment, Heritage and Local Government, 2005; Heritage Council, 2005; Leitrim County Council, 2003; Wexford County Council, 2007). The Cork plan employs residency conditions to enforce this. In addition, several interviewees raised instances of locals who obtained planning permission to build houses for permanent use but then sold them for use as second homes. This type of activity reflects the weaknesses of planning enforcement arrangements in Ireland but also the specific difficulties associated with enforcing local residency conditions. In the view of one planner: 'The idea is a good one, but it is difficult to enforce'. On the other hand, the issue of housing in the Irish countryside has become increasingly contested in recent years, with new proposals for additional controls on this type of housing in some policy statements, including the *National Sustainable Development Strategy* and the *National Spatial Strategy* (Department of the Environment, 1997; Department of the Environment and Local Government, 2002a, 2002b; Winston, 2007). Efforts to control second home building, coupled with capacity problems associated with the volume of planning applications, have made the rural planning system more bureaucratic and complex for permanent residents to negotiate. One local councillor complained:

Second homes are making it so difficult for the genuine person to get fecking planning because there has to be so much checking done, what with these spurious [applications for permission to build] holiday homes, that the Council has to check, otherwise the place would be ruined.

***Environmental Impacts***

Some argue that second home tourism may be a 'relatively environmentally friendly' form of rural development because owners often care about the natural and physical environments, lobby for its preservation and restore vernacular buildings for use as second homes (Downing and Dower, 1977). Our research revealed some instances of this phenomenon. Second home owners played a key role in the campaign against the clearing of woods for housing in Courtown (Mottiar and Quinn, 2003). In addition, several interviewees from Drumshanbo mentioned the valuable role some second home owners had played in 'buying old farmhouses with a little bit of ground around them and ... doing them up and making them pretty'.

However, due to the predominance of newly built dwellings in the stock of second homes, these environmental advantages are only of marginal relevance to the Irish case. Furthermore, many second homes are single dwellings which have been constructed in scenic, environmentally sensitive areas of the countryside and the environmental impacts of the growth in this type of dwelling are particularly negative. These negative impacts are similar to those highlighted in other studies on this topic including: the transformation of the countryside into a 'consumption landscape'; wildlife disruption due to clearance of vegetation; pollution due to sewage disposal, especially near lakes, rivers and the sea; and transportation between primary and second homes, particularly problematic with regard to one-off housing in the open countryside and transnational second home ownership; and impact on the landscape (Clout, 1971; Downing and Dower, 1973; Finnerty *et al*, 2003; Gartner, 1987; Ilbery and Bowler, 1998; Mathieson and Wall, 1982; Paris, 2008a, 2008b; Ragatz, 1977; Scott, 2005). In both Courtown and Schull second home development created significant problems regarding water supply, and sewage treatment. In some locations, raw sewage is being pumped into the sea and inland waterways.

Limited water supply was one the most significant environmental issues noted by respondents in our study. Water shortages are common in July and August and, in recent years, fire brigades have had to go out to certain areas to supply water. One council engineer reported:

Inevitably from the water supply point of view like you're at your most vulnerable in the middle of the summer, because it's raining the least and that's... the time when all the vacant houses are filled up and everyone wants water. We have to put in infrastructure then to deal with that number of people and ... I won't say it's lying dormant, but there's less demand for it for the rest of the year.

A number of respondents referred to the issue of heating houses all year around when they are only used for a couple of weeks in the year. There were also problems in each area regarding the poor maintenance of second homes compared to principal residences, particularly in Drumshanbo where maintenance of the large numbers of long-term vacant dwellings was particularly problematic. Concerns were also raised in each area regarding the extra traffic created by second home owners at certain times.

In view of these problems, it is striking that environmental issues were not that prominent among interviewee's concerns about second homes and that the problems most prominent in the literature were rarely raised by them. Irish attitudes to the environment have improved in recent years, but this has been from a very low base and economic interests tend to take priority over environmental ones (Kelly, 2007). Pollution from septic tanks attached to second homes in the countryside was identified as a problem by only one person, despite the fact that ineffective and inadequately maintained septic tanks are one of the main polluters of rural waterways in Ireland (Crowley, 2006). This lack of concern may reflect the general strong support for one-off rural housing among interviewees and in rural Ireland more generally. As a result, negative landscape impacts of second homes were rarely raised but when they were, criticism was confined to estate developments in villages, which were most unpopular. Thus, for instance, a Drumshanbo resident complained:

The whole housing explosion.... In ways it has spoiled little villages. They have been virtually thrown up willy nilly these estates. It seems to have killed the character... particularly these... apartment blocks... they don't fit in... I'd say there'd be a kind of unease at the speed at which they are going up, and the planning behind it isn't evident.

## Conclusions

This chapter has highlighted the marked growth in the numbers of second and vacant homes in Ireland in recent years, particularly in certain regions. This development is linked to economic and population growth, the 'laissez faire' nature of land use planning in rural Ireland, the particularly high rate of housing output since the mid 1990s, the generous fiscal treatment of housing, and tax incentives to encourage house building in economically marginal areas. In addition the social, economic and environmental impact of this development in three high amenity rural districts was examined. Second homes have had some social and economic benefits in each of our

case study areas. However, their environmental consequences have been almost universally negative in Ireland due to the prominence of newly constructed dwellings, compared with many other countries (Downing and Dower, 1977). While respondents in Schull identified some social and economic problems associated with second and vacant homes, they proffered the most positive assessment of their impact compared with the other areas. This may be due to the fact that Cork has the lowest proportion of second and vacant home development of the three sites, and was the only one not subject to area specific tax incentives for house building. Social impacts were less positive in Courtown, which suffered from the over development of both principal and secondary residences. Both the social and economic benefits are questionable in Drumshanbo as excess housing output resulted in a glut of long-term vacant dwellings and short-term economic benefits, largely confined to construction employment. Notably, the key socio-economic problem associated with second homes in the UK, negative implications for permanent residents' housing affordability, was not such a prominent issue in our case studies (Gallent, *et al*, 2005). This is because, unlike the UK, Ireland's laissez-faire planning system still facilitates the construction of houses in the open countryside and self-building is common among permanent residents as a means of cutting the costs of entry to home ownership.

In Courtown and Drumshanbo, the output of vacant and second homes was driven by area based tax incentives. Our analysis casts severe doubt on the value of this type of rural development initiative which has driven housing over-supply rather than economic and population growth (see also: Keane and Garvey, 2006). In Drumshanbo, locals were aware of these limitations prior to the introduction of the RRS. While commercial development incentives were introduced as part of the RRS, they were modest in scale and their introduction was delayed due to anti-competitiveness concerns from the European Commission (Goodbody Economic Consultants, 2005). However, Courtown demonstrates that even where business development incentives are available, when they are in competition with housing development incentives, investment is overwhelmingly attracted to the latter - a less complicated prospect for small investors with the prospect of higher returns during a housing boom (Department of Tourism, Sport and Recreation, 1999). This finding raises questions about the thrust of rural development policy in Ireland more generally, because expenditure on these housing related reliefs dwarfs that of other comparable initiatives.

Had more robust land use controls been in place, the worst excesses of housing overdevelopment in Courtown and Drumshanbo might have been avoided. Under-resourced planning departments were a significant contributor to this problem. Planning applications to Leitrim County Council doubled during the period of the RRS compared to the preceding four years, yet no additional resources were provided to process these applications (Heritage Council, 2005). However, in the absence of additional resources, recent efforts to make the system more robust by enforcing housing residency requirements have made the planning system more bureaucratic and difficult to negotiate.

The international research on second homes tends to ignore the national and regional consequences of rising numbers of second homes, largely because, like this chapter, much of it is based on case studies which assume that their wider consequences are positive if the local impacts are beneficial. However, research on regional housing output patterns and house prices in Ireland which highlights the limitations of this assumption. It indicates building second and vacant dwellings in rural areas diverted construction away from population growth centres where housing needs were most pressing and this had negative implications for the efficient functioning of those regions (Norris and Shiels, 2007a). Moreover, the construction of empty dwellings resulted in significant house price inflation between 2000-2003 both at national level and in the peripheral rural regions where these dwellings are concentrated. It also had particularly negative consequences for the latter as it made it 'unnecessarily expensive' for people to live and operate businesses there (Fitz Gerald, 2005: 16). Building empty houses boosted the local construction industry, but it depressed the rest of the economy in these areas. In addition, it has become increasingly clear as the Irish economic boom has shuddered to a halt in the last year that such rates of construction employment is unsustainable and, given that Ireland's decade long house price boom has recently ended, there is a danger that a flood of empty and second homes to the market may significantly undermine housing markets in these regions.

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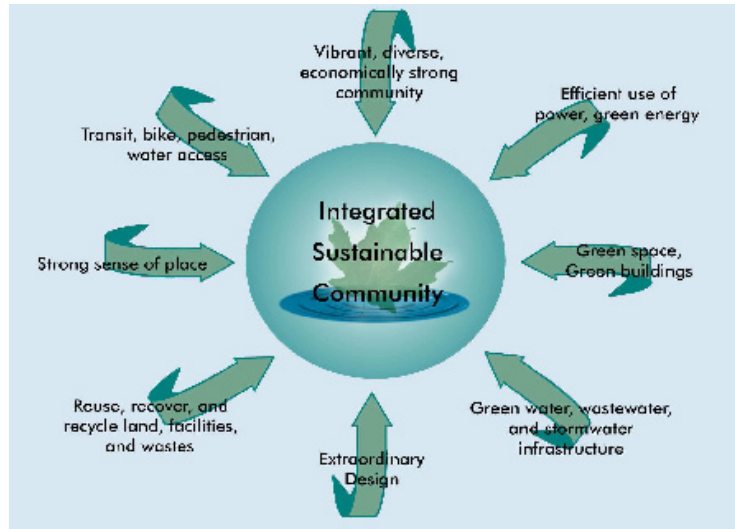
## **8 Sustainable Transformation of Toronto's Waterfront**

*Lisa A. Prime and Anna Palamarchuk*

Implementing sustainable community development is a growing trend as municipalities and developers both work to determine what it means in different contexts. The waterfront in Toronto is an important location as an urban downtown brownfield setting. Waterfront Toronto, the institutional entity established to manage the urban regeneration process, has been working over the past several years to revitalize derelict lands and to transform them into an urban community, based on strong corporate principles founded in sustainability. The Province of Ontario *Places to Grow Plan for the Region*, which discourages low density suburban sprawl and encourages intensification in established urban centres, further supports Waterfront Toronto objectives. These approaches to development, along with rising public awareness of traffic congestion and environmental concerns, reinforce public support for the sustainable redevelopment of Toronto's waterfront and long term intensification.

### **Commitment to Sustainability**

The imperative that guides Waterfront Toronto's progress is its *Sustainability Framework*, which sets out objectives and targets based on eleven environmental themes (TWRC, 2005). The focus is on implementing these objectives that contribute to transforming the market towards sustainability. Figure 8.1 identifies the main components essential for the creation of sustainable communities through integrated design. The emphasis is on smart technologies, green infrastructure, sustainable transportation, recycling, excellence in design and a strong sense of place.

**Figure 8.1.** Integrated Sustainable Communities

Neighbourhood development in the first two precincts, the West Don Lands and East Bayfront, will include green buildings at a LEED (Leadership in Energy and Environmental Design) Gold standard. Waterfront Toronto has defined mandatory Green Building Requirements that emphasizes energy efficiency as well as the use of an integrated design process. The requirements also mandate buildings with increased ground floor ceiling height for long term flexibility, in-suite metering, green roofs and three-stream waste management as key elements that contribute to meeting sustainable objectives.

The approach to green buildings was established when LEED was in its infancy in the Canadian market and 'Gold' was considered a stretch objective. Still a challenging level to attain (needing a minimum 39 of 70 points from the LEED credit system), the number of buildings in Toronto alone registered to implement the third party rating system is climbing, and the expectations that buildings under development will achieve LEED GOLD is not unrealistic. This implies that the market is clearly transforming in the areas of energy and environmental awareness for buildings and that Waterfront Toronto's leadership, by contributing to advance this trend, is well founded (TWRC, 2005). As the designated waterfront area is primarily public land, Waterfront Toronto has the ability to continue to pursue the

delivery of aggressive sustainability objectives, while others come independently to those decisions.

**Figure 8.2.** East Bayfront High Density Neighbourhood Development



Green buildings are one important aspect of what defines sustainable neighbourhood development; however, there are other important elements that contribute to maximizing the holistic approach to sustainable development at a community scale. East Bayfront is being targeted as a prime site to attract significant new employers to the city (Figure 8.2). The new district will have 7,000 residential units and jobs for 8,000 people. Key elements of the East Bayfront precinct plan include: 5.5 hectares of parks and public open spaces, 1.5 km water's edge promenade, 1,400 units of affordable rental housing, and one million square feet of commercial space for retail, culture and offices.

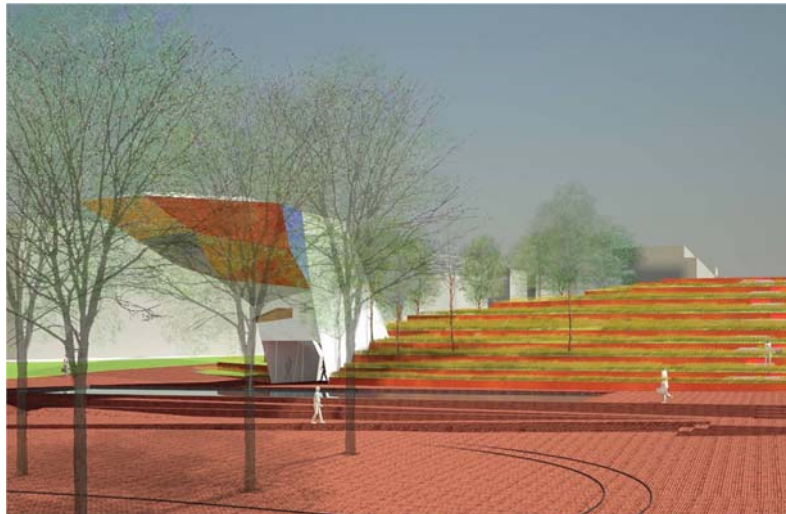
In addition, Waterfront Toronto is pursuing a sustainable solution to neighbourhood infrastructure, such as district energy and 'intelligent communities' high speed broadband. These services enhance the sustainability of development by providing a foundation through 'future proofing' delivery of these services to neighbourhoods. District energy, which will connect all buildings to a central energy system, means the transfer to advanced technologies, such as co-generation and renewable options, over time can be delivered comprehensively within the neighbourhood (see Figure 8.4). This contributes to the positive impact of efficient buildings at a neighbourhood scale. The delivery of high speed broadband for the neighbourhood increases employment opportunities and enhances 'live

work' options for the community. This is also seen as the most progressive opportunity to address the lifestyle needs of an advanced sustainable community.

**Figure 8.3.** East Bayfront Water Promenade



**Figure 8.4.** West Don Lands- District Energy Building and Plaza



Applying fundamental planning principles through neighbourhood design sets the basis for sustainability. For the waterfront, this includes compact mixed use family-oriented development at increased densities, which include mid to high rise development, compatible with surrounding neighbourhoods. It also includes high order transit, alternate transportation modes, world class parks, community uses and emphasis on design excellence in architecture. This all contributes to a recognizable quality of place that can attract people to a lifestyle focused on walking to work, local shopping and amenities; where living with a decreased footprint, less focused on the automobile, can be more attainable (Urban Design Associates, 2005).

Current initiatives to support this direction include implementing “Woonerfs”, or pedestrian oriented streets in key connecting areas, alternative stormwater management, risk assessment for brownfields and development of criteria for sustainable parks, which like the Green Building Requirements, will provide some important direction for park designers on how to consider implementing sustainability. This will include guidance on strategic decisions for design that relate directly to important themes, such as energy, water, transportation, and storm water management. All of these examples combine to demystify what a sustainable community is or should be, with emphasis on creating an environment where elements implemented are recognizable to the area.

## **LEED for Neighbourhood Development**

Acknowledging this transition in green building philosophy from a single-purpose perspective to a more integrated strategy, the US Green Building Council (USGBC) launched LEED for Neighbourhood Development (ND) in 2007, as a pilot, in a joint venture with the Congress for the New Urbanism and the Natural Resources Defense Council. Waterfront Toronto has been participating in the USGBC LEED ND pilot program in order to test its strategies for sustainability by the third party rating system. LEED ND focuses on the certification of neighbourhood development projects that incorporate new urbanism, smart growth and green building principles. Taking green development beyond the threshold of energy-efficient buildings, LEED ND projects also pursue community-scale issues such as development density and proximity, walkable streets, affordability, community involvement, and diverse local uses. Points in the rating system are awarded in four categories: 1. *Smart Location and Linkage*, 2. *Neighbour-*

*hood Pattern and Development, 3. Green Construction and Technology, and 4. Innovation and Design Process.*

By meeting multiple purposes and incorporating the human relationship into the built environment, LEED ND is also applying a different way to approach planning – an integrative and cooperative process that brings together the ideas of the public and the synergies of many disciplines in order to obtain desired environmental, economic and social outcomes. Done well, a good development practice and neighbourhood-vitalization model emerges, yielding positive community impacts within a more inclusive and transparent planning framework. This approach is in line with Waterfront Toronto's long-term goal of revitalizing 2,000 acres of brownfields adjacent to Toronto's downtown core, while simultaneously addressing a wider public policy agenda.

Participation in LEED ND has allowed Waterfront Toronto to be recognized for its sustainability efforts but also to challenge and advance the corporation's objectives and priorities at a neighbourhood scale. Some of the notable aspects are cited here. The LEED ND rating system awards credits for locations that are adjacent to existing towns and city centres, areas with good transit access, infill sites, and previously developed sites. The Waterfront Toronto LEED ND project site area is approximately 194 acres and includes about 18,500,000 square feet of new mixed-use communities on previously developed brownfield sites adjacent to existing Toronto neighbourhoods such as the Distillery District, South Riverdale, and St. Lawrence Market.

Healthy living is achieved by the mixed-use nature of Waterfront Toronto's high-density communities, which allow residents to live within cycling and walking distance to their day-to-day destinations, including parks and open-spaces, basic shopping needs and personal and community services. The residential density is approximately 211 dwelling units / acre, with a non-residential density of approximately 4.4 Floor and Area Ratio (FAR).

The West Don Lands, one of the first precincts planned by Waterfront Toronto, located on a brownfield site in the southwest corner of Downtown Toronto, is very much aligned with the LEED ND requirements for sustainable community development and healthy living. It is envisioned as a high density mixed-use community with an emphasis on urban living that integrates natural and built environments (Urban Design Associates,



2005). Key Elements of the West Don Lands Precinct Plan are:

- 23 acres of parks and public spaces including 18-acre Don River Park
- Public transit within a five-minute walk of all residences
- 5,800 residential units, including 1,200 units of affordable rental housing
- One-million square feet of employment space
- Pedestrian & cycling connections within the neighbourhood and to the city centre
- Elementary school and recreation centre
- Two childcare centres.

**Figure 8.5.** West Don Lands- Pedestrian and Transit Orientated



The precinct will offer a wide variety of housing types and scales from townhouses to condominiums for a variety of income levels, a broad range of community facilities and employment opportunities, extended public transit service, improved pedestrian and cycling linkages, and an assortment of parks and open spaces, including natural areas, active and passive parks, plazas, parkettes and streetscapes (see Figure 8.5). The most distinguishing park will be Don River Park, a 19.5 acre park on the Don River, which will also serve as a flood protection landform. The streets of the

precinct will be designed to lead to the park, emphasizing the connection to natural open space (AMEC, 2009).

Convenient transportation choices such as buses, trains, car pools, bicycle lanes and sidewalks are emphasized in the LEED ND rating system to reduce Greenhouse Gas emissions, improve air quality and produce healthy, sustainable and animated communities. In line with LEED ND, a key component of Waterfront Toronto communities will be transit, walkability and expanded cycling opportunities. Waterfront Toronto's Transit First Policy will ensure that new residents can make sustainable transportation choices immediately upon occupancy with security that the public service will be maintained (TTC, 2008). Close to 90 per cent of dwelling units will be within ¼ mile walk distance of a transit ride and 86 per cent of dwelling units will be within a ¼ mile walk distance to a trail. Provisions will also be made for bicycle parking spaces for all buildings and for continuous sidewalks along both sides of all streets within the project site.

Reducing Greenhouse Gas emissions is highlighted throughout the LEED ND program as an essential part of developing sustainable communities. In addition to reducing automobile use and increasing access to public transportation and in line with LEED ND requirements, Waterfront Toronto has also made Greenhouse Gas reduction a central focus by constructing all buildings to rely on District Heating and Cooling, mandating LEED Gold certification for all buildings, and requiring a 40% reduction in design energy cost, energy consumption metering, and energy star appliances for each suite. In addition, Waterfront Toronto has committed to recycling and salvaging at least 50 per cent of construction debris and to include facilities to separate garbage, recycling and compost in each unit for all buildings. By recycling, Waterfront Toronto conserves the energy used in the original extraction, transportation and manufacturing of the item.

One of the pioneering features of LEED ND is how the program addresses social conditions in the built environment, enhancing quality of life and encouraging transparent planning processes. For example, Waterfront Toronto has made commitments to ensuring 20 per cent affordable housing, incorporating and rehabilitating heritage properties (such as 409 Front Street, a City of Toronto listed heritage property known as the Canary Restaurant) and extensive public and stakeholder consultation. In addition, River City, the first block to be developed within the West Don Lands precinct, addresses the social dimension of the built environment by incorporating environmental initiatives that will instill a lasting culture of sustain-

ability. For example, an education assistance program will be developed to instruct residents, using information sessions and reference literature, on the benefits of sustainable living and green building technologies.

Waterfront Toronto's approach to revitalization in the West Don Lands, and across the waterfront, is a comprehensive and coordinated one. The major benefits of this approach include cost-effective planning and delivery of public infrastructure and greater ease attracting private investment because of the certainty and added value generated by area-wide plans compared to individual projects. This comprehensive approach is essential for the implementation of LEED ND three stage certification process. Waterfront Toronto initially has undertaken Stage 1 certification, which is optional and occurs before the planning approval process begins.

## Concluding Comments

Building on the success of the US pilot, the Canada Green Building Council is working on a Canadian version of the LEED ND rating system, anticipated in 2009. Waterfront Toronto and other Canadian projects that are participating in the US pilot are informing the adaptation of the rating system in Canada by sharing experiences and offering suggestions to improve the program as an effective tool for sustainable community development.

The expansion of this new rating system within the family of LEED categories is testimony to the valuable contribution it makes to realizing sustainable development. By incorporating all three pillars of sustainability, these dynamic communities will yield positive social and environmental impacts within a more inclusive planning process.

As knowledge and experience with sustainable development progresses, the Corporation continues to build on the foundation of the Framework as it moves into implementation. Most recently, the Corporation has been exploring the next wave of how technology will shape sustainable communities. *The Sustainability Framework's* "Net Plus" approach will continue to be the foundation of how Waterfront Toronto continues to plan progressive communities. How technologies such as the Intelligent Communities agenda, or broadband infrastructure, will continue to shape our environment is proving to bring exciting challenges moving forward. In order to take advantage of these sorts of progressive changes however, the foundation has to be put in place. Waterfront Toronto presents a leading edge ap-

proach that other communities can look to for advancing implementable strategies to push the market.

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## **9 Tools for a Sustainable Built Environment: Guidelines for Subtropical Design**

*Rosemary Kennedy and Rachel Katoshevski-Cavari*

South East Queensland (SEQ) is Australia's fastest-growing region, attracting an average of 55,000 new residents each year. The historic *South East Queensland Regional Plan 2005-2026* (OUM, 2005), and subsequent *Draft South East Queensland Regional Plan 2009-2031* (DIP, 2008) aim to manage growth sustainably through a policy of compact urbanisation and consolidation. This requires a shift to a level of density not previously experienced in the generally low-density environment of Queensland. A critical characteristic of the regional vision is that 'development is sustainable, well designed, and the subtropical character of the region is recognised and reinforced'. The explicit inclusion of the subtropical aspect with sustainability in the regional planning agenda recognises the significant roles that regional identity and appropriate design for climate play in the achievement of ecologically sustainable development.

This chapter discusses the development of subtropical design principles and guidelines to support sustainable outcomes for SEQ. The chapter begins with a description of the region, and a discussion of subtropical character and identity. The guidelines themselves have been through a process of development including peer review of the initial draft, and testing and validation of the second draft. A sample of one of the principles is included with excerpts from feedback from planners elicited via a detailed questionnaire.

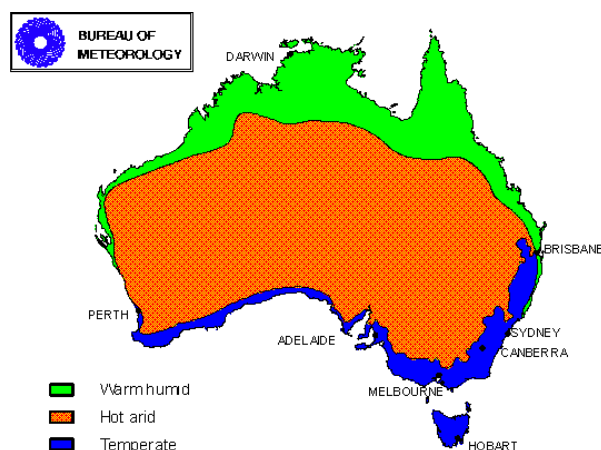
### **The Regional Context**

Queensland's south eastern corner is the most populous part of the State, and is the fastest growing region of Australia. The population of the South East Queensland (SEQ) region, estimated at 2.8 million people in 2006, is expected to increase to 4.4 million people in 2031 (DIP, 2008). Existing

dwellings numbered 1.125 million in 2006. The projected population increase, combined with the continuing trend towards smaller households will require an estimated 735,500 new dwellings to be constructed in the region by 2031. At least 325,500 new dwellings are expected to be created in infill and redevelopment areas, and the balance on broadhectare land. The large number of homes, and the accompanying infrastructure they require, including employment opportunities, will have a major impact on the territory and the form of the cities in the region. The Queensland Government has established an overall regional plan with statutory authority to work with local Councils to meet this urban planning challenge, taking into account the need to mitigate the effects of and adapt to climate change. The region comprises eleven regional and city councils, including the City of Brisbane, capital of Queensland.

The region is in the subtropical climate zone (Figure 9.1) and is bordered in the east by the Pacific Ocean and in the west by the Great Dividing Range.<sup>1</sup>

**Figure 9.1.** Australian Bureau of Meteorology Urban Climate Zones



Source: Image reproduced permission © Commonwealth of Australia 2006, Bureau of Meteorology (ABN 92 637 533 532)

The climate is characterized by warm, humid, and often wet, summers with mild dry winters. Prevailing breezes come from the coast (the North-East and South-East) during much of the year. Dry, high winds come from

<sup>1</sup> Photographs and figures are from the authors' archive unless otherwise specified.

the inland, notably, cold westerly winds in winter. There is some climate variation from the coastal strip to the hinterland and inland areas. The further from the coast the higher the summer temperatures and the colder the winter temperatures.

However, so benign are the natural conditions in subtropical Queensland that the environmental temperature only slips outside the 'comfort zone'<sup>2</sup> on the coldest of winter mornings and on a few truly enervating days of summer heat and humidity. The extremes of heat or cold experienced in climate zones elsewhere are not a feature of SEQ. Queensland coastal areas are described as having low frequency of days of heat discomfort due to the prevailing onshore winds and the cooling effect of adjacent uplands. The average number of heat discomfort days per year in the Brisbane area is between five and ten (Australian Bureau of Meteorology, 1989, p.36.), but on average Brisbane only experiences one degree day over 35°C annually. Though forecast 'climate change' impacts are acknowledged, for example an expected increase in the number of days over 35°C (Office of Climate Change<sup>3</sup>, 2008, p.14) and more frequent extreme weather events such as severe storms and flooding, the climate experienced by SEQ is predicted to be still generally equable.

The climate is comfortable enough to be outdoors all year round – but in recent decades the local enthusiasm for the outdoors has not been incorporating into the design of homes, offices and neighbourhoods. As a result, many buildings and much urban development is very resource intensive, and typically car-dominated. The regional planning environment now recognises that the region's climate can be used to advantage to develop low-energy urban form and low-energy buildings.

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<sup>2</sup> The range of conditions, including temperature, humidity and air movement, which provides thermal comfort is called the 'comfort zone'. The subjective nature of comfort is accounted for by assuring that a certain minimum percentage of occupants (say 70 per cent) find the conditions comfortable. Evaluation of comfort in a particular environment is usually based on the 'comfort votes' of many people. Ballinger et al. (1992, pp 38-9) use the term 'environmental temperature' to describe the combined effects of air temperature and the mean radiant temperature of surrounding surfaces.

<sup>3</sup> The Office of Climate Change in the Queensland Government has prepared a document – *Climate Change in Queensland: What the science is telling us* – that analyses international and national climate change science and assesses its significance to Queensland's regions and sectors. The report draws on two main sources: the *IPCC Fourth Assessment Report* and the CSIRO and Australian Bureau of Meteorology *Climate Change in Australia — Technical Report 2007*.

## Identifying Aspects of Subtropical Character and Identity

SEQ's distinctive character and identity is predominantly influenced by the subtropical climate, diversity of natural landscapes, and the outdoor-oriented lifestyle that has evolved in response to the subtropical context. Over the years, inhabitants developed a synergistic relationship between the built environment and the subtropical setting. Pre-WW2 suburbia (Figure 9.2) is characterised by the Queensland vernacular form of high-set 'timber and tin' housing. Its lightweight structure readily accommodated the south-east's hilly terrain, and space for outdoor living and recreational activities in a variety of settings, dominated by lush vegetation, became an essential part of the urban fabric.

**Figure 9.2.** The Pre-war Inner Ring Suburb of Paddington, Brisbane



Individual dwellings and patterns of settlement, were well-reconciled to the surroundings and 'alive' with the subtle central quality of place that Alexander (1979) called 'the quality without a name'. Yet as SEQ experi-



ences the pressures of population growth, and as more people turn to the air-conditioner for thermal comfort, the region's generally pleasant macro-climatic characteristics are ignored, regional character and identity is under threat, and rates of consumption of energy has steadily increased. Buildings and neighbourhoods of indifferent design have proliferated in recent decades, and growth and sprawl are perceived to have eroded the character of SEQ's urbanised places (Figure 9.3).

One way to address the problems of contemporary cities is through re-connection to, and creative engagement with the climate, culture and landscape, that is, through a place's character and identity. Brisbane City Council (2002) first made the connection between planning, design and climate in the *Living in Brisbane 2010* corporate vision, with aspirations for 'a city designed for subtropical living' amongst other themes. The *SEQ Regional Plan 2005-2026* (OUM, 2005) followed this lead in 2005. The re-worked city vision *Living in Brisbane 2026* (BCC, 2006) describes 'a well-designed subtropical city – where you can hear the birds by day, and see the stars at night' – clearly linking the local planning and design to a bio-diverse, pollution-free healthy environment. Each of these vision statements recognise that the region's character can be used to advantage to develop innovative low-energy buildings and urban form.

**Figure 9.3.** Buildings and Neighbourhoods Not Sensitive to the Climate in South East Queensland



One way to address the problems of contemporary cities is through re-connection to, and creative engagement with the climate, culture and landscape, that is, through a place's character and identity. Brisbane City Council (2002) first made the connection between planning, design and climate in the *Living in Brisbane 2010* corporate vision, with aspirations for 'a city designed for subtropical living' amongst other themes. The *SEQ Regional Plan 2005-2026* (OUM, 2005) followed this lead in 2005. The re-worked city vision *Living in Brisbane 2026* (BCC, 2006) describes 'a well-designed subtropical city – where you can hear the birds by day, and see the stars at night' – clearly linking the local planning and design to a bio-diverse, pollution-free healthy environment. Each of these vision statements recognise that the region's character can be used to advantage to develop innovative low-energy buildings and urban form.

The place-identity perspective is an extremely valuable driver for achieving ecologically sustainable urbanism in a subtropical environment. However, discussions of character and identity in subtropical Queensland are often heavily influenced by the low-density ethos, and are sometimes misinterpreted as an imperative to preserve what is distinctive about individual vernacular houses, rather than as an impetus to prevent the degeneration of the local environment and support future urban lifestyles. Meanwhile, mainstream values, such as the thermal comfort levels of an affluent society becoming accustomed to the monotony of dry, conditioned internal environments, and preferences for low-densities, make it difficult to envisage, let alone realise, an alternative urbanism to the one dependent on air-conditioned buildings and the private motor vehicle.

Through a series of workshops and design charrettes, the Centre for Subtropical Design<sup>4</sup> has identified two over-arching values which characterise the subtropical place-identity agenda in subtropical SEQ. They are:

- A sense of openness, and permeability
- Engagement with natural environment

It is posited that if these two values remain as essential ingredients of new denser, more sustainable environments, the subtropical character and identity of the region can be strengthened and that the proposal for sustainable future environments will become a reality.

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<sup>4</sup> The Centre for Subtropical Design is an initiative of Brisbane City Council and Queensland University of Technology, in partnership.

These two over arching values informed a base for determining a list of elements for the built environment which are important for maintaining subtropical character and identity particularly within the context of a more compact urban environment.

- An open and permeable environment - allows for openness to the penetration of the natural environment, openness of space, openness to the sky and access to breeze.
- An open and permeable urban environment has a continuum of open space from public to private. Compact urbanisation requires a higher percentage of integrated purpose-designed semi-outdoor space than was the case in earlier low density developments where open space was largely outdoor garden space.
- Open and permeable buildings - the subtropical climate encourages a built form which includes layers of lightweight structures and elements that can be adjusted to suit conditions – traditionally manifested by verandahs on buildings, usually facing the street.
- Life outdoors - the subtropical climate means that significant time can be spent outside all year round providing adequate shade from the sun is available. Permeable urban blocks that privilege pedestrians over vehicles with shaded public spaces, streets and pathways support a walkable and connected compact city.
- Life outdoors - the subtropical climate and has fostered a strong sense of informality in the subtropical lifestyle. Multi-purpose private and semi-private outdoor living spaces areas are essential in denser environments.
- Connection with natural environment and landscape. Significant natural features such as mountain ridgelines, rivers, headlands and beaches are accessible both visually and physically.
- Strong presence of nature – the natural environment (land, air, flora and fauna) of subtropical SEQ is valued for environmental health, well-being and sustainability. Lush vegetation tempers the urban micro-climate and supports biodiversity. The built environment and natural environment should be integrated and in balance.
- Strong presence of water. Acknowledgement that this cooling, refreshing, life-giving element is both finite and essential for a 'living' green city.

The challenge of developing principles for appropriate design outcomes for subtropical South East Queensland (SEQ) is to be explicit about how the changing urban environment can continue to express an ongoing positive relationship with the natural environment. The subtropical design approach understands the link between lifestyle and climate and how design that encourages living with our climate, rather than locking ourselves away from it, can achieve sustainable solutions. Positive responsiveness to the climate is simply good design in the subtropics to support sustainability goals. Subtropical design is climate responsive, resource conscious, water sensitive, and values sensitive.

Not only are new solutions to the urban form and structure of our built environment and infrastructure required (residences, workplaces, learning places, recreational spaces, neighbourhoods, roads, transport systems, pedestrian systems, open space networks) but also required is a change in the community perceptions of how subtropical lifestyle values might be fulfilled within this new form of urban and suburban environment and the infrastructure which supports it. For the residents of the region, this relationship will be a defining element of their regional identity.

## **The Planning Process**

The *draft SEQ Regional Plan 2009-2031* (DIP, 2008) is intended to guide state and local area planning and urban development within a clear sustainability paradigm. The regional vision for SEQ is for a future that is sustainable, affordable, prosperous, liveable and resilient to climate change, where:

...communities are safe, healthy, accessible and inclusive; there are diverse employment opportunities, and quality infrastructure and services, including education and health; urban and rural areas are mutually supportive and collaborative in creating wealth for the community: development is sustainable, well-designed and the subtropical character of the region is recognised and reinforced; ecological and culturally significant landscapes are valued, celebrated and protected: and the community has access to a range of quality open space and recreational opportunities. (Draft South East Queensland Regional Plan 2009-2031: Part B, p.9).

The Plan identifies the connection between planning, and the need to reduce demand for energy and reductions in greenhouse gas emissions. A number of Desired Regional Outcomes (DRO's) are expressed as Regional Policies. The DRO expressed by Regional Policy 8, Smart Growth is:

a compact urban pattern of well-planned communities, supported by a network of accessible and convenient centres and transit corridors close to residential areas, employment locations and transport...

The Smart Growth policy includes a specific principle (8.3) “Urban Character and Design” pertaining to subtropical design: “Design and site new development to reflect SEQ’s subtropical climate, reinforce local character and achieve design excellence and innovation”. This principle includes four policies (Box 9.1) which deal with sense of place, passive climatic design for the subtropics, design value, and high-quality public domain.

**Box 9.1. Urban Character and Design Policies**

1. Ensure that infill and redevelopment reinforce the strengths and individual character of the urban area in which the development occurs.
2. Ensure all new development and appropriate infrastructure such as public transport stations incorporate subtropical design principles, including orientation, siting and passive climate control.
3. Achieve design excellence for all new prominent buildings and public spaces in the Brisbane CBD, regional activity centres and transit communities.
4. Provide for an accessible and high-quality public domain in all new and existing urban development areas by allocating or revitalising open space and creating well-designed public places.

Source: draft SEQ Regional Plan, 2008, 8.3 p.88

To support these policies, the draft Plan identifies twelve principles of subtropical design (Box 9.2).

**Box 9.2. Subtropical Design Principles for SEQ**

- **Recognise sub-regions:** recognise and reflect SEQ’s diverse climatic, landscape, cultural, and habitat sub-regions when applying design principles.
- **Respect topography:** protect the integrity and character of the hills, mountains and ridgelines that frame and define the subtropical environment.
- **Diversify the built environment:** incorporate diverse building densities, heights, type, and scale into new developments.
- **Consider local character and design:** recognise how contemporary design and appropriate building materials contribute to the subtropical environment’s character and diversity.
- **Integrate with nature:** design for appropriate climate-based orientation, provide shade and the breeze, sunlight and the natural environment to

penetrate.

- **Acknowledge informality:** recognise the informal relationship among the natural built and rural environments.
- **Use vegetation:** use extensive native vegetation and large shade trees in private and public spaces, particularly along pedestrian and cycling corridors.
- **Ensure open space diversity:** diversify, integrate and design open space to form networks.
- **Incorporate access to open space:** reflect the proximity of nature in subtropical environments and SEQ's outdoor-based lifestyle in the access to open space.
- **Design for water:** reflect the importance and presence of water and provide for public access to any natural or artificial waterways.
- **Develop outdoor centres:** outdoor dining, entertainment, recreation, sheltered access to public transport and shaded pedestrian pathways create informality and a village-like character.
- **Develop outdoor meeting places:** incorporate outdoor meeting places into building and design.

Source: draft SEQ Regional Plan, 2008, 8.3 p.88

## The Guidelines

As the twelve principles are presented in the SEQ Regional Plan in a broad way, another layer is needed to move from the broad non-operational principle, to a level that can be used in the planning community as a usable tool for guiding and assessing subtropical design in urban planning. Many of the concepts are at a high level and therefore require a local authority to set a direction for subtropical design at a strategic level in its organisation and planning scheme. Currently there is no direct link with these principles and day-to-day development assessment processes by local authorities. Clearly a statutory approach may be beneficial and central to achieving desired outcomes, particularly those pertaining to quantifiable reductions in energy usage. However, a statutory approach alone is unlikely to optimise subtropical design outcomes, and indeed may make it even harder to maintain and nurture character and identity. A combination of initiatives is needed including information, guidance and education to build capacity in local authorities' skills sets in order to understand the principles and implement appropriate strategies to achieve outcomes. These guidelines developed by the Centre for Subtropical Design are aimed at assisting local authorities to address these gaps.

A scientific approach was used to develop a guideline tool to guide the planning and approval of plans in this changing area. This tool suggests “strategies for implementation” for each of the draft SEQ Regional Plans’ twelve subtropical design principles. It is aimed at local authorities, planners, and developers for use in assessing subtropical design in new as well as in existing urban plans.

For each of the twelve principles a general explanation of the principle was added, and a number of strategies suggesting how the principle should be implemented in any urban plan were devised. These strategies explicitly support the design outcome (discussed previously) and derived from the literature survey (Abbate, 2006; Barratt & Godber, 2006; Brisbane City Council, 2004; Brisbane City Council, 2003a; Stalker, 2006; O’Hare, 2006; Richards, 2004; Gold Coast City Council, 2003b; Western Australian Planning Commission, 2000; Maroochy Shire Council, 2000; Munro, 2006; Brisbane City Council, 2003; Centre for Subtropical Design, 2004). In addition, guidance is given regarding whether the individual strategy is relevant to a greenfield development, infill development or both.

The first draft of the guideline was sent personally to planners in seven local municipalities in the region with a detailed questionnaire that asked for their response concerning the clarity of the explanation and each of the strategies. In addition they were asked to indicate the relevance of each strategy to the principle, to their work and the relevance of the level of the strategy to their work. The questionnaire also included some general questions which asked about their overall attitude to the suggested guideline, and whether it was relevant to greenfield or infill development, or both.

The overall responses for the suggested guidelines were positive and supportive however some suggested changes in the strategies were mentioned. Whilst the first draft contained some diagrams from Abbate’s (2006) work as examples, respondents specifically requested more diagrams and images to explain the strategy, and to illustrate how certain recommendations can be achieved. Some respondents also sought prescriptive requirements for deep planting areas, minimum dimensions, minimum % of soft landscape areas, required mix of vegetation (within minimum sizes). The first draft was concerned with contents, however, some respondents indicated a need to change the format of the final guideline, for its ease of use. Table 9.1 describes a sample principle, explanation, selected strategies, and respondents’ feedback.

**Table 9.1.** Sample of ‘First Draft’ Strategies and Respondent Feedback

|   |
|---|
| <p><b>Subtropical Design Principle 7 : Use vegetation</b></p> <p>Make use of extensive native vegetation and large shade trees in private and public spaces.</p>  |
| <p><b>Why this is important</b></p> <p>Vegetation, particularly characterised by the dense greens of mangroves, and the large scale of Moreton Bay figs, hoop pines and bunya pines, is a key to local character and identity. Such vegetation also supports climatic comfort, and outdoor activity. It is essential to ensure urban growth is balanced with increased tree cover, particularly if aspirations for walkable journeys in compact environments are to be realised.</p> <p><b>Respondent’s comment:</b></p> <p><i>Explanation is clear, but unsure why those specific species were used. Mangroves are only part of the identity of a miniscule proportion of the SEQ environment.</i></p> |
| <p><b>Sample Strategies for Implementation</b></p>  |
| <p>Mature landscape needs to be part of the townscape analysis of any new project, ensuring the dominance of rich green is still a primary character of the built environment</p> <p><b>Respondent’s comment:</b></p> <p><i>Strategy is clear – but what is a “townscape analysis”?</i></p> <p><i>This is not relevant to this level of planning scheme.</i></p> <p><i>I think a bigger issue is how is green to be a “primary character” where buildings are the “primary” outcome? How will this be assessed? Location and scale of planting needs to be better considered upfront in determining density, setbacks etc to ensure this is achieved.</i></p>   |
| <p>Street design incorporates substantial avenue planting to assist the creation of memorable streets and provide shade to the footpath.</p> <p><b>Respondent’s comment:</b></p> <p><i>In addition to the street design, the building setback and awning location/design, design-location-number of crossovers, location of underground services and associated development requirements to plant street trees, will assist in achieving this outcome</i></p>   |
| <p>Allow large shade trees to flourish in private and public space between buildings, and between building and streets</p> <p><b>Respondent’s comment:</b></p> <p><i>Great principle, but need detail of how design/density etc can allow them to flourish....</i></p>  |
| <p>Minimise the extent of vegetation loss and identify opportunities to repair, maintain and improve.</p> <p><b>Respondent’s comment:</b></p> <p><i>Strategy is unclear. Words like “minimise” are virtually useless in a planning tool.</i></p> <p><i>“Opportunities to” .... is too vague, need to explain precisely..</i></p>  |
| <p>Advocate green walls and rooftop gardens in high and medium density development</p> <p><b>Respondent’s comment:</b></p> <p><i>Great, but need to have a technical code that deals with issues of structure, other servicing requirements, capacity to maintain ie water, etc - we need to provide the detail on how to do it and ensure DA are able to assess it, otherwise it will be put in the ‘too hard’ basket. Also how ensure is maintained appropriately over time (which unfortunately current Brisbane examples generally are not) – compliance issue maybe.</i></p>   |



Require pedestrian footpaths in all new developments to have continuous tree cover. Choose trees with broad spreading canopies where practical.

**Respondent's comment:**

*Is this on site frontage only, or also internal to the site e.g. in a retail development. How to reconcile with vehicular access, Public Transport stops, awnings in high use areas?*

*Need to be clear that new developments is not just in new areas; significant planting in established areas is critical and should complement public sector street tree planting.*

The second draft of the guidelines was created based on all comments. The guide presents the 12 principles as they appear in the SEQ Plan, but gives an explanation of why each principle is important, followed by practical implementation strategies. These strategies provide a framework for the consistent improvement of the quality of public space. Many strategies are applicable to more than one principle and these are cross-referenced in the guide. The guide will contain a mix of performance guidelines and prescriptive requirements. Table 9.2 gives an example of the more detailed explanatory narrative which will accompany the principle, and a list of strategies that are relevant for the specific principle.

**Table 9.2.** Sample of Explanatory Narrative and Strategies for Principle 7

**Subtropical Design Principle 7 : Use vegetation**

Use extensive native vegetation and large shade trees in private and public spaces, particularly along pedestrian and cycling corridors.

**Why this is important**

In the SEQ context, an emphasis on foliage and vegetation amongst the built form and its infrastructure offers great opportunities for a sense of place which is both instantly recognisable and is part of our landscape heritage.

Vegetation is essential urban infrastructure, particularly in a compact urban form, and should be considered first in decisions about what, where, why and how to build.

Subtropical landscape features such as large scale trees of both native and non-weedy exotic species, growing in public places and private backyards have traditionally been integral elements of the urban environment in SEQ. Given the microclimate benefits afforded by broad canopy trees, urban growth should include increased tree cover, particularly if the aspirations for walkable journeys in a compact environment are to be realised.

Mature trees increase landscape values and enhance the aesthetic characteristics of the urban environment. Well-planned and maintained vegetation modifies air quality and air movement, screens hard or visually unappealing surfaces and increases visual privacy. Vegetation can also enhance views between buildings or between built form and open space. Vegetation supports biodiversity, cooling urban heat islands, helps manage storm water quantity and quality, and provides perceived

noise reduction, as well as acting as a dust filter and greenhouse gas sink.

### Strategies

1. Accompany increasing levels of urban consolidation with increasing consolidation of urban tree cover (Figure 9.4)
2. Use vegetation to create a sense of place and to enhance the subtropical landscape within both public and private spaces.
3. Create diversity of subtropical landscapes, parks and gardens by using a mixture of layers, shapes, species and colours, including a mixture of native and non-weedy exotics.
4. Plan for extensive vegetation cover in medium density residential and mixed use developments. Ensure the design of new medium density and mixed use developments preserves quality semi-private open spaces and provides for an increase in tree cover, on both public and private land, through the regulation of minimum setbacks, and the inclusion of deep planting areas over basements and on podiums.
5. Green walls and roof planting are advocated to enhance ground-based vegetation in high density and medium-density developments. (Figure 9.5)
6. Design for contiguous vegetated areas through all stages of the development process. Identify existing biodiversity corridors to ensure any new development links into these.
7. Optimise the balance between built up and green areas. Create a diversity of parks within the neighbourhood. In the subtropical climate, a number of small parks and vegetated open spaces are more efficient in terms of microclimate optimisation than one large, centrally located park or lake.
  - In existing parks, ensure the retention and provision of soft landscape, significant amounts of shade and a diversity of subtropical planting.
8. Identify the appropriate types of subtropical plants for planting on the streets and public places, semi-public and private open spaces, taking into account effective shade, cooling paths, public safety, site soil conditions, and location.
9. Provide for pedestrian footpaths in all new developments to have continuous tree cover. Choose trees with broad spreading canopies where practical.
  - Ensure additional street tree planting is provided as part of any new development in infill situations, where possible. Infill tree planting should complement established trees in existing streets.
10. Ensure vegetation within a development does not block breezes and prevent natural ventilation. High shrubs in the subtropics may partly block wind and negatively impact the humidity level without developing useful shade.
  - Incorporate substantial avenue planting in street design to assist in the creation of memorable streets and to provide shade to footpaths using a mixture of layers, shapes, species and colours, including a mixture of native and non-weedy exotics, using tree trench technology to provide sufficient above and below ground space to provide protection of the pavement from the tree roots, integrate storm water management and promote longevity of the trees.

10. Balance building heights and vegetation. Provide sufficient landscape area to ensure trees compliment the building form and design for sufficient above and below ground space to provide protection of the building from the tree roots and longevity of the tree(s)
11. Ensure soft landscape elements predominate over hard landscape in order to:
  - Mitigate existing and avoid new occurrences of hot spots and adverse microclimate
  - ensure the passive cooling of open spaces co-ordinating sustainable landscaping with water and energy sensitive urban design
  - integrate with other values of pervious surfaces such as improve surface water flow (passive storm water management) and hydrology.
12. Ensure that landscaping and boundary treatments for houses on lots of less than 450sqm are designed to optimise microclimatic conditions by enabling air movement, northern solar access and maximum shading for eastern and western aspects. For example, fences need to be at least 50% permeable or no more than 1m in height if solid, and gardens should contain predominantly soft rather than hard surfaces.

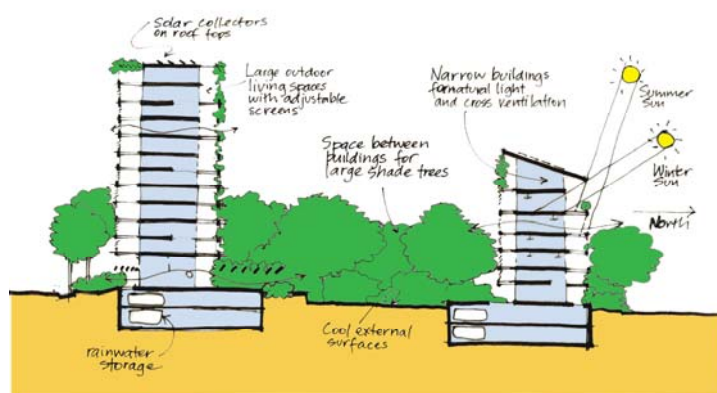
**Figure 9.4.** Brisbane's Middle Ring Suburbs with Increasing Levels of Urban and Tree Cover Consolidation



## Concluding Remarks

We have presented a new tool to be implemented in SEQ for assuring the characteristics of subtropical design are included in all the planning levels of the region. This tool is developed in a way that is usable for all planners

**Figure 9.5.** Green Walls and Roof Planting for Higher Density Developments



and developers involved in the development approval process. This guideline was developed for SEQ in a scientific way and is an example for a method that is dealing with a creation of a tool leading planning to a defined need/necessity. This is a relevant means for addressing the gap between the general planning directions defined by the Local Authorities in a broad way, to the actual every day planning process. Hence, although the study is targeting the SEQ region, the tool which is developed here can be adapted to be used in other places as well.

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## 10 Sustainable Community Planning and Evaluation in Calgary

*Sasha Tsenkova and Rose-Mary Damiani*

### Monitoring and Evaluation in Community Plans: A Missing Link

Various types of policy evaluation can occur at different points of policy formation and application. Much of the literature regarding planning policy evaluation focuses on *ex-ante* evaluation; the evaluation of the expected outcomes (i.e. costs and benefits, etc.) of policies as a means to choose between various alternatives in the policy formation stage (Bracken, 1981; Lichfield *et al.*, 1975). However, *ex-post* evaluation with an emphasis on outcome based performance is rarely carried out in planning practice. The evaluation is concerned with the outcomes of the plan and determines whether the policies should be continued, modified, or terminated (Patton and Sawicki, 1986). A number of studies point to the need for continuous monitoring and evaluation of community plans to establish a feedback loop (Barton *et al.*, 2003; City of Calgary, 1997). First, the continuous surveying of the conditions produced by the implementation of plans is needed; and second, an evaluation of the survey to enlighten and adapt plans to improve progress and reach initial goals. This cycle in community planning is often not accomplished (Kelly and Becker, 2000). A lack of monitoring limits the information about the performance of plans, and in turn limits the extent of a comprehensive *ex-post* evaluation. The result of this incomplete feed back loop is a tendency in land use planning to proceed with plans without a proper evaluation of the extent of their influence on intended outcomes. Calkins (1979) refers to this lack of evaluation as “new plan syndrome”, in which plans are updated or redone without regard to the implementation status of the originally prepared plan.

Planning without evaluation can propagate design and development characteristics that may not be achieving the intended plan outcomes, with either positive or negative externalities. “In the planning literature, evaluation is used primarily to understand why planning – planners, planning practice – does what it does instead of whether or not plans are invoked...the reasons why planning fails are unearthed exhaustively without sufficient empirical grounding in what planning has failed (or succeeded) to do” (Talen, 1996, p. 249). Evaluation of community plans, and *ex-post* evaluation in particular, propagates and supports informed decisions and can act as a communication tool for describing the impacts and value of particular plans (Seasons, 2005). Evaluation can be a means of learning by doing. Consistent evaluation of plan outcomes can clarify what constitutes effective planning practice in substantive terms while adding empirical evidence to theoretical discussions (Talen, 1996; Seasons, 2005). These benefits of planning evaluation have become much more important in the current discourse on sustainable community planning, where a good understanding of successful plan implementation is instrumental in urban growth management (Kim, 2005; Roseland, 2005). 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).

## **Objectives and Methodology of the Research**

This research attempts to develop a framework for *ex-post* evaluation of community plans, drawing on the main sustainability objectives in a major planning policy document adopted by the City of Calgary in 1995. The *Sustainable Suburbs Study* (SSS) promoted alternative practices in land use planning to create socially and environmentally responsive communities. The study emphasized three important policy goals central to sustainability:

*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, 1995, p. 3)

In addition, 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 embedded in *Calgary Transportation Plan (1995)*, *Calgary Municipal Development Plan (1998)*, and *ImagineCALGARY (2006)*, the most recent Long Range Urban Sustainability Plan (City of Calgary, 2007). While the *SSS* was a pivotal document in the history of land use planning in Calgary promoting city-wide sustainability objectives, there has been no formal monitoring of performance and/or evaluation of its implementation to date. As the *SSS* comes under review, the *ex-post* evaluation process seeks to assess the compliance of new communities in Calgary with the goals, objectives and policies articulated in the *Sustainable Suburbs Study (SSS)*, as well as to determine the gap between the *SSS* policy objectives and the results manifested in a sample of new communities in Calgary. The evaluation centers on compliance of the Area Structure Plans (ASPs)—policy and land use planning documents guiding development in new communities—as well as implementation outcomes manifested in the built environment. The research is designed to assist the analysis and evaluation of the effectiveness and efficiency of planning policies directed at more sustainable growth management in the new communities of Calgary.

The research has the following objectives:

- To develop a framework for evaluating the implementation of *Sustainable Suburbs* planning policies;
- To apply the evaluation framework to a sample of new communities and to assess the success of plan implementation.

The methodology combines quantitative and qualitative methods including a literature review, policy content analysis, case study analysis and key informant interviews. The literature and policy document review inform the development of the evaluation framework and the selection of indicators that are measurable, reliable and manageable. The policy analysis explores the fiscal, institutional, environmental and social trends that affect the implementation of sustainable design and development strategies in the

suburban context of Calgary in the last decade. The case study approach allows the application of the evaluation framework to a sample of communities representative of development trends. Further, indicator measures and outcome ratings, grouped in several sustainability clusters/themes for each community, are summarized in community report cards. Finally, input from key informant interviews is essential for the selection of conceptually appropriate case studies as well as for the actual implementation of the evaluation framework.

## Evaluation Framework

Policy evaluations can occur at various points of policy formation and application. In the evaluation of community plans, the process begins by specifying policy goals and outcomes that are the requirements for achieving those goals (Moursund, 1973). The outcomes are physical representations of the goals. Criteria or indicators then need to be specified as a means to determine outcome performance.

**Table 10.1.** Sustainability Themes Derived from SSS Goals and Objectives

| Key Issues Identified in the SSS Policy Context   | Planning, Urban Design & Development Implication                | Sustainability Thematic Cluster Derived from SSS |
|---|---|--|
| Manage City's costs of accommodating growth; Use land more efficiently; Encourage people to commute by transit              | Transportation; Housing density; Employment opportunities       | <i>Efficiency</i>                                |
| Provide local services and amenities; Provide more housing choice;  | Community Cores & Nodes; Housing form and choice                | <i>Diversity</i>                                 |
| Encourage people to walk and cycle within the community; Improve access to local facilities                                 | Transportation; Open Space                                      | <i>Accessibility</i>                             |
| Protect and integrate natural systems where possible; Encourage home builders and home buyers to reduce waste and pollution | Parks & Open Space; Stormwater Management; Environmental Issues | <i>Environmental Responsibility</i>              |

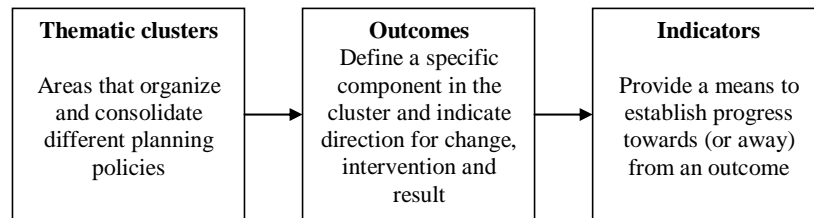
Source: Damiani, 2008

Indicators tend to be objective and measurable representations of planners' standards and development criteria. Indicators may relate to 'accessibility' (or spatial interactions) and 'space' (e.g. density of development) measures of the built environment to evaluate outcome performance (Bracken, 1981, p. 79). For each indicator a target is set to represent the intended outcomes, which is used as the basis for comparison with the real world measures of the plans evaluated (Patton and Sawicki, 1986). The development of an evaluation framework to analyse the degree of compliance and/or the performance gap between *the SSS* policies and development in new communities follows the general rules outlined in the planning literature. The framework's content is derived from the hierarchical structure of goals, objectives and policies of *the SSS*. The goals introduce a long-term vision for the form and function of new suburban communities in Calgary, while the objectives define a strategy for a more sustainable planning and design of new communities. The planning policies align with the design-based principles of well-known sustainable suburban planning practices promoted by the Smart Growth Network and New Urbanism (City of Calgary, 1997; 2007). The goals and objectives are categorized into a policy matrix presented in Table 1 to identify four broad sustainability themes/clusters—efficiency, diversity, accessibility and environmental responsibility—by which plan implementation is evaluated.

Due to the number of policies and the overlapping nature of the policy intentions, the evaluation framework consolidates different planning policies into intended outcomes that identify the direction for change and intended results. The sixteen outcomes in the framework are closely related to thematic sustainability clusters, as indicated in Figure 10.1. Furthermore, performance in the clusters is evaluated through a system of indicators, developed to measure the achievement of intended outcomes, based on the performance criteria set out in the *SSS*. The indicators selected are based on a number of planning evaluation frameworks at the community or neighbourhood level (see for example Smart Growth Network, 2003; Strathcona County, 2007; US Green Building Council, 2007). It should be acknowledged that the selection of indicators is restricted by data availability, but more importantly considers the criteria of relevance, logical interpretation, reliability and manageability (Wong, 2006; Sustainable Seattle, 1998). The indicator measures are then translated into a rating system representing the degree of performance. The result is a community report card that is user-friendly, simple to use, but fairly robust with a range of quantifiable measures that reflect clear relationships between outcomes, objectives and goals. The indicators require the use of practical methods of data collection or measurement (e.g. content analysis of ASPs and/or per-

sonal observation of development patterns in new communities to create accessible data). An effort is made to create a manageable system with sufficient information to complete a thorough analysis, while maintaining a preference for quantitative data to minimize personal bias (Tsenkova, 2006). 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). 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.

**Figure 10.1.** Evaluation Framework



Source: Tsenkova, 2005

A rating method is applied to the system of indicators to simplify the data into a 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. The partial rating for each outcome is determined from the indicator ratings. Though the number of indicators associated with each outcome varies, the related indicators are assumed to be of equal value in determining the partial rating of outcomes. The community report card presents the degree of plan implementation based on a composite rating. A composite rating, ranging from one to twelve for each sustainability thematic cluster, indicates the extent of policy implementation. The composite rating is derived by adding the partial ratings, from zero to three, of the outcome statements. Each outcome statement is weighted equally in the composite rating (Damiani, 2008).

### Indicator Profiles and Indicator Rating Scales

Each policy outcome has related indicators to measure and evaluate the extent of compliance in the community plan (ASP). The rating system indi-

cates the extent of implementation by translating the indicator measures into a rating system.

- 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.

***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 (City of Calgary, 1995, p. 46).

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

***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.

*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 (City of Calgary, 1995, p. 55).

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

*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 (City of Calgary, 1995, p. 54).

*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, ranging from 2-6.

**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, ranging from 1 to 4 for multiple uses.

**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 (City of Calgary, 1995, p. 29).

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

*Rating:* Represents the extent to which design accommodates home occupations reflected in 1 to 3 specific design elements.

**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 (City of Calgary, 1995, p.22).

*Rating:* Signifies compliance with the distance requirement.

*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 m<sup>2</sup> of commercial development per resident within the community

*Rating:* Represents compliance with the area minimum requirement, ranging from 1 to 2 or more m<sup>2</sup> of commercial development per resident.

*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 res-

idents will access the facilities and services located at the core by walking or cycling.

*Requirement:* Majority (over 85%) of residents within 400 m of community commercial amenities

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

***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, 1995, 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 (4 to 10 or more uses); the node scale is based on the average number of uses, ranging from 2 to 7.

***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.

*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, 2007, p.12)

*Rating:* Represents the inclusion of potential affordable housing units ranging from 1 to 15% of the total (City of Calgary, 1995, p. 48).

***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 as well as their potential to be frequented by residents living in walking and cycling distance. A graduated density pattern is recommended.

*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, ranging from 50 to 100% of multi-family housing being in the core/community node.

***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, 1995, 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 to better accommodate pedestrians and cyclists with values ranging from 50 to 100% of parking located to rear/side of commercial facilities.

*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, 1995, 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 ranging from 50 to 100%.

***Outcome #10: Increase the Quality of Street Patterns and Design for Pedestrians, Cyclists and Transit-users.***

*Indicator:* Incidence of 4-way intersections

*Sustainability Concept:* Develop pedestrian, cyclist and transit-friendly street design to offer alternative routes, rather than funneling vehicle traffic onto a limited number of streets (City of Calgary, 1995, p. 55). 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 (Skeith, 2002, p. 68).

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

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

*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.) (City of Calgary, 1995b, p. 51).

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

*Rating:* Signifies the extent of permeability of through-streets in/out of the community, ranging from 1 to 3 through streets (650-250m).

*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 (City of Calgary, 1995, p. 52).

*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 measured by 50-100% of the streets with calming features.

*Indicator:* Proportion of residential development without front-drive garages

*Sustainability Concept:* Enhance the streetscape by incorporating features such as: buildings which front on the street, porches, front windows, and small front yard setbacks. 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 (City of Calgary, 1995, p. 47).

*Unit of Assessment:* rear lanes

*Rating:* Represents the degree of residential development without front-drive garages ranging from 50-100%.

*Indicator:* Proportion of block faces with sidewalks

*Sustainability Concept:* 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).

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

*Rating:* Represents the extent to which pedestrians are accommodated along streets with public sidewalks ranging from 50-100% in the community.

**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 (City of Calgary, 1995, p. 35).

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

*Rating:* Indicate the accessibility of open space ranging from 75-100% of the residents.

*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 (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, ranging from 1 to 4 types.

*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 (1 to 3 or more groups).

**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, 2007).

*Requirement:* Number of types of environmental open space in the community—passive recreational areas and educational opportunities while protecting and maintaining natural systems (City of Calgary, 1995, p. 33).

*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.

**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 (1 to 3 or more).

**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.

*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.

#### **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 (number of requirements met).

#### **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

District-heating or co-generation techniques (City of Calgary, 1995, p. 70).

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

*Rating:* Signifies the consideration of energy-saving practices in site planning and construction based on number of requirements met.

### **Applying the Evaluation Framework**

The evaluation framework is applied to a sample of new communities in Calgary. The case studies are selected with the assistance of senior planners from the City of Calgary and include four of the 22 communities with ASP approved in the last decade. The case study communities range in size from 247 to 407 ha and are located in the outer suburban territory of Calgary. McKenzie Towne adopts the new urbanism framework and has been recognized with a Canadian Institute of Planners Award of Excellence as well as by the Urban Land Institute for its unique form of suburban development. The other two suburban communities (Evergreen and Bridlewood), according to city planners have been extensively influenced by SSS policies (City of Calgary, 1997). Garrison Woods—as the last case study in the sample—is somewhat different. This infill community of 70 ha is identified as best practice in sustainable neighbourhood design and development in Calgary. It has received recognition through 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. Development in all case study communities has been initiated in 1997 and with the exception of Garrison Woods, which is built-out, is an ongoing process.

| Table 10.2. McKenzie Towne Report Card   |   |   |                   |                |
|--|---|---|-------------------|----------------|
| Theme  | Outcomes  | Indicators  | Indicator Rating* | Partial Rating |
| Efficiency   | #1: Achieve a minimum gross density of 7 upa.   | Residential Unit Density  | 2                 | 2              |
|  |   | Locating transit network and stops in ASP                                     | 1                 |                |
|  | #2: Increase the accessibility, comfort and safety of public transportation.  | Proportion of dwelling units within 400m of transit network                   | 3                 | 2              |
|  |   | 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              |
| Diversity  | #4: Increase home occupations.  | Number of design elements tailored for home occupations                       | 0                 | 0              |
|  |   | Distance of core from regional shopping centre                                | 1                 |                |
|  | #5: Increase accessibility to mixed-use activity centres.   | Ratio of commercial development per resident                                  | 2                 | 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              |
| Accessibility  | #7: Increase the variety of housing types in addition to single-family type dwellings.                              | Mix of public and private uses  | 1                 |                |
|  |   | Proportion of dwelling units that are multi-family units                      | 1                 | 2              |
|  | #8: Increase accessibility of multi-family development to activity centres.   | Affordable housing program  | 2                 |                |
|  |   | Proportion of multi-family units located within 400m of commercial activities | 2                 | 2              |
|  | #9: Increase accessibility for pedestrians and cyclists within activity centres.                                    | Proportion of parking spaces located to side or rear of the site              | 2                 | 3              |
| #10: Increase the quality of road patterns and streetscape design for pedestrians, cyclists and transit-users. | #11: Increase accessibility to various recreational opportunities.  | Proportion of retail access points fronting the street                        | 3                 |                |
|  |   | Incidence of 4-way intersections  | 0                 |                |
|  | #12: Increase the amount of existing natural systems incorporated into the open space plan.                         | Community through-street spacing  | 0                 | 1              |
|  |   | Number of traffic calming features  | 1                 |                |
|  | #13: Increase the use of alternative methods to stormwater management.  | Proportion of residential development with rear lanes                         | 3                 |                |
|  |   | Proportion of block faces with sidewalks                                      | 3                 |                |
|  | #14: Reduce the amount of waste entering landfills from the construction process and homeowners in new communities. | Access to open space  | 3                 |                |
|  |   | Range of outdoor recreational activities                                      | 1                 | 2              |
|  | #15: Reduce water consumption.  | Organized community involvement in planning & management                      | 1                 |                |
|  |   | Presence of environmental open space  | 1                 | 1              |
| #16: Reduce non-renewable energy consumption.  | #16: Reduce non-renewable energy consumption.   | Alternative stormwater management features integrated in open space plan      | 2                 | 2              |
|  |   | Construction waste management   | 0                 |                |
|  | #16: Reduce non-renewable energy consumption.   | Household and commercial activity waste management                            | 1                 | 1              |
|  |   | Household water consumption reduction practices                               | 2                 | 2              |
|  | #16: Reduce non-renewable energy consumption.   | Non-renewable energy reduction practices                                      | 0                 | 0              |



| Table 10.3. Evergreen Report Card   |  |   |                  |                |  |
|---|--|---|------------------|----------------|--|
| Theme   | Outcomes   | Indicators  | Indicator Rating | Partial Rating |  |
| Efficiency  | #1: Achieve a minimum gross density of 7 upa.  | Residential Unit Density  | 1                | 1              |  |
|   |  | Locating transit network and stops in ASP   | 0                |                |  |
|   |  | Proportion of dwelling units within 400m of transit network                                 | 3                | 1              |  |
|   |  | Transit Stop Quality  | 1                |                |  |
|   | #2: Increase the accessibility, comfort and safety of public transportation.                                   |   |                  |                |  |
|   |  |   |                  |                |  |
|   | #3: Achieve shared use of sites and/or buildings for public facilities and services.                           | Number of shared use sites and/or buildings   | 0                | 0              |  |
|   |  | Number of design elements tailored for home occupations                                     | 0                | 0              |  |
|   | Diversity  | #4: Increase home occupations.  |                  |                |  |
|   |  |   |                  |                |  |
|   |  |   |                  |                |  |
|   |  |   |                  |                |  |
|   |  |   |                  |                |  |
|   |  |   |                  |                |  |
| #5: Increase accessibility to mixed-use activity centres.   |  | Distance of core from regional shopping centre  | 1                |                |  |
|   |  | Ratio of commercial development per resident  | 1                | 1              |  |
|   |  | Centrality of Core  | 1                |                |  |
|   |  | Mix of public and private uses  | 2                | 2              |  |
| #6: Achieve a significant mix of uses in the community core and neighbourhood nodes.                                | Mix of public and private uses   | 1   |                  |                |  |
|   | Mix of public and private uses   | 1   |                  |                |  |
|   | Proportion of dwelling units that are multi-family units   | 1   | 1                |                |  |
|   | Affordable housing program   | 1   |                  |                |  |
| #7: Increase the variety of housing types in addition to single-family type dwellings.                              |  |   |                  |                |  |
|   |  |   |                  |                |  |
|   |  |   |                  |                |  |
|   |  |   |                  |                |  |
| #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              |  |
|   |  | Proportion of retail access points fronting the street                                      | 0                |                |  |
|   |  | Incidence of 4-way intersections  | 0                |                |  |
|   |  | Community through-street spacing  | 1                |                |  |
|   | #10: Increase the quality of road patterns and streetscape design for pedestrians, cyclists and transit-users. | Number of traffic calming features  | 1                | 1              |  |
|   |  | Proportion of residential development with rear lanes                                       | 1                |                |  |
|   |  | Proportion of block faces with sidewalks  | 2                |                |  |
|   |  | Access to open space  | 3                |                |  |
|   | #11: Increase accessibility to various recreational opportunities.   | Range of outdoor recreational activities  | 1                | 2              |  |
|   |  | Organized community involvement in planning & management                                    | 1                |                |  |
|   |  | Presence of environmental open space  | 1                | 1              |  |
|   |  |   |                  |                |  |
|   | Environmental Responsibility   | #12: Increase the amount of existing natural systems incorporated into the open space plan. |                  |                |  |
|   |  |   |                  |                |  |
|   |  |   |                  |                |  |
|   |  |   |                  |                |  |
| #13: Increase the use of alternative methods to stormwater management.  |  | Alternative stormwater management features integrated in open space plan                    | 2                | 2              |  |
|   |  | Construction waste management   | 0                |                |  |
|   |  |   |                  |                |  |
|   |  |   |                  |                |  |
| #14: Reduce the amount of waste entering landfills from the construction process and homeowners in new communities. |  | Household and commercial activity waste management  | 0                | 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 10.4. Bridlewood Report Card

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

| Table 10.5: Garrison Woods Report Card  |   |   |  |                |   |
|---|---|---|--|----------------|---|
| Theme   | Outcomes  | Indicators  | Indicator Rating   | Partial Rating |   |
| Efficiency  | #1: Achieve a minimum gross density of 7 upa.<br><br>#2: Increase the accessibility, comfort and safety of public transportation.<br><br>#3: Achieve shared use of sites and/or buildings for public facilities and services.   | Residential Unit Density  | 3  | 3              |   |
|   |   | Locating transit network and stops in ASP                                     | 2  |                |   |
|   |   | Proportion of dwelling units within 400m of transit network                   | 3  | 3              |   |
|   |   | Transit Stop Quality  | N/A  |                |   |
| Diversity   | #4: Increase home occupations.  | Number of shared use sites and/or buildings                                   | 0  | 0              |   |
|   |   | Number of design elements tailored for home occupations                       | 0  | 0              |   |
|   |   | Distance of core from regional shopping centre                                | 3  |                |   |
|   |   | Ratio of commercial development per resident                                  | 2  | 2              |   |
| Accessibility   | #5: Increase accessibility to mixed-use activity centres.<br><br>#6: Achieve a significant mix of uses in the community core and neighbourhood nodes.<br><br>#7: Increase the variety of housing types in addition to single-family type dwellings.<br><br>#8: Increase accessibility of multi-family development to activity centres.  | Centrality of Core  | 2  |                |   |
|   |   | Mix of public and private uses  | 3  | 3              |   |
|   |   | Mix of public and private uses  | N/A  |                |   |
|   |   | Proportion of dwelling units that are multi-family units                      | 3  |                |   |
|   |   | Affordable housing program  | 1  | 2              |   |
|   |   | Proportion of multi-family units located within 400m of commercial activities | 2  | 2              |   |
|   |   | Proportion of parking spaces located to side or rear of the site              | 3  |                |   |
|   |   | Proportion of retail access points fronting the street                        | 3  | 3              |   |
| Environmental Responsibility  | #9: Increase accessibility for pedestrians and cyclists within activity centres.<br><br><br><br><br><br><br><br><br><br><br>#10: Increase the quality of road patterns and streetscape design for pedestrians, cyclists and transit-users.<br><br><br><br><br>#11: Increase accessibility to various recreational opportunities.<br><br>#12: Increase the amount of existing natural systems incorporated into the open space plan. | Incidence of 4-way intersections  | 0  |                |   |
|   |   | Community through-street spacing  | 2  |                |   |
|   |   | Number of traffic calming features  | 1  | 2              |   |
|   |   | Proportion of residential development with rear lanes                         | 3  |                |   |
|   |   | Proportion of block faces with sidewalks                                      | 2  |                |   |
|   |   | Access to open space  | 3  |                |   |
|   |   | Range of outdoor recreational activities                                      | 1  | 2              |   |
|   |   | Organized community involvement in planning & management                      | 1  |                |   |
|   |   | Presence of environmental open space  | 0  | 0              |   |
|   |   | #13: Increase the use of alternative methods to stormwater management.        | Alternative stormwater management features integrated in open space plan | 0              | 0 |
|   |   |   | Construction waste management  | 1              |   |
|   |   |   | Household and commercial activity waste management                       | 0              | 1 |
| Household water consumption reduction practices                                     | 2   |   | 2  |                |   |
| #15: Reduce water consumption.<br><br>#16: Reduce non-renewable energy consumption. | Non-renewable energy reduction practices  | 0   | 0  |                |   |
|   |   |   |  |                |   |

The evaluation results are presented in the community report cards with the indicator, partial and composite ratings (see Tables 10.2, 10.3 and 10.4 and 10.5). The indicator ratings related to each outcome are averaged to derive the partial rating ranging from zero to three. The composite rating is the total of the partial ratings in each thematic cluster, while the sum of the four sustainability cluster ratings represents the overall performance score. While detailed analysis and interpretation of the community report cards is beyond the scope of this paper, the evaluation summaries identify limited success in the implementation of sustainable planning policies in the four major thematic clusters. McKenzie Towne and Garrison Woods perform better compared to the more traditional suburban communities reaching a score of 23/24 out of 48.

### ***Efficiency***

Land use planning policy has improved land efficiencies through the increase of unit densities in new communities, particularly in McKenzie Towne and Garrison Woods, but has failed to realize economic efficiencies through shared sites and/or buildings (Damiani, 2008). Such practices could have increased the intensity of use on sites and of buildings while in turn providing facilities that could enhance local activity by residents. Further, home occupations have not become a significant element of new communities. Residents continue to leave the community for employment purposes. Though access to transit service is adequate according to SSS requirements, transit has not been given priority in core and node design as a comfortable and viable means of transportation. Travel by private automobile continues to be a more attractive option for community residents thus leading to higher cost per capita in transit service and downstream costs on road infrastructure.

### ***Diversity***

The integration of diverse housing options and basic service and retail opportunities within new communities has had relative success. The share of multifamily housing in three of the case studies ranges from 25 to 36 per cent, while Garrison Woods accommodates 88 per cent. Suburban communities remain predominantly single family neighbourhoods (see Figure 10.2).

**Figure 10.2.** Diversity of Housing Types in Garrison Woods Contrasted with the Typical Suburban Home with a Front Garage in Evergreen



While in most cases an attempt is made to provide a range of dwelling types to accommodate different types of households, there is a lack of provision of affordable (non-profit and/or assisted) rental housing. Furthermore, opportunities to satisfy basic daily needs—shopping, recreation, work, education—within the community are provided through the land use mix in community cores and nodes. Such policies in practice have had a limited success with an average of 65% of the residents within walking distance to community amenities. In all communities under review basic commercial needs and schools are concentrated within the core, while neighbourhood nodes have evolved predominantly as open spaces with low intensity of use (see Figure 10.3).

**Figure 10.3.** Mixed-use Buildings in the Community Core of Garrison Woods and Open Spaces in the Neighbourhood Node of Bridlewood



### **Accessibility**

Planning policies related to accessibility have had satisfactory performance. Street patterns remain curvilinear and public space along the street does not meet the enhancements for a comfortable pedestrian environment. Pedestrians and cyclists are accommodated through segregated pathway systems that provide direct linkages to community focal points. It should be acknowledged that the design of boulevards and major streets has been

enhanced in McKenzie Towne and Garrison Woods through extensive sidewalks, trees and traffic calming measures. Rear lanes are commonly used to provide for narrower lots in all new communities under review, although to a more limited extent in Evergreen and Bridlewood. This provides an improved streetscape from the common front-drive garage style single family home.

The design of the community cores in McKenzie Towne and Garrison Woods represent good practices relative to the SSS policies and a successful attempt to promote pedestrian-oriented design. By contrast, in Evergreen and Bridlewood community core sites are auto-oriented with vast parking lots and access points oriented towards these parking areas (see Figure 10.4). All new communities have significant amount of open space provided through the 10% dedicated land as municipal reserve. Access to open space areas is very good, but the types of recreational activities remain limited, mainly accommodating passive and children's recreational activities.

**Figure 10.4.** Community Core in Evergreen Contrasted with High-street Retail in McKenzie Towne



### ***Environmental Responsibility***

Performance in this area is extremely limited. Planning policies implemented relate to alternative storm water practices and wetland conservation (see Figure 10.5). Waste management initiatives remain limited to the inclusion of community recycling bins, while non-renewable energy use was not enhanced through planning policy or any other means.

**Figure 10.5.** Stormwater Management Incorporated in the Open Space Areas of McKenzie Towne and Bridlewood



### Concluding Comments

In summary, the research suggests that 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 as integrated design policy promoting waste, water and energy management in ASPs was absent. 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. 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*, setting a direction for new community design and development that is more sustainable.

*The results of the research need to be interpreted in the context of its limitations.* First, the evaluation indicators are referenced from a limited number of community plans (ASPs). Second, data accessibility is a considerable constraint in the development and application of an indicator-based evaluation framework. 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. Third, the ranking system provides a rapid assessment of a complex subject. Such a framework can conceal detailed information on different elements of sustainability, presenting the potential for misinterpretation (Tsenkova, 2006). However, rigorous analysis and interpretation of the ratings provides an added value

by converting the evaluation information into knowledge on policy gaps and implementation challenges (Wong, 2006, p. 81). Lastly, due to the long-term timeframe of ASPs and the pace of actual development none of the communities under review is completely built-out (with the exception of Garrison Woods). Indicators are based on the actual built form and the anticipated development types and forms derived from the approved ASPs, thus excluding future developments and/or changes. Despite these limitations, insights gained from the ex-post evaluation can inform the policy review and enhance the development of new planning policies and performance standards promoting sustainable patterns of development in Calgary.

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## 11 The Edge at Davy Lands

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### Introduction

This chapter presents the work of a group of graduate planning students at the Faculty of Environmental Design, University of Calgary. The Davy Lands project provided an opportunity to apply principles of smart growth and sustainable community planning in practice. Organised as a six-week intensive research course, taught by Dr Tsenkova, the project created a framework for experiential learning and discourse on a wide range of strategies to pursue sustainability in the planning of suburban communities. The chapter presents a community plan for Davy Lands—a new community on the edge of the City of Airdrie. Students broadened their knowledge of urban sustainability through field visits, lectures, hands-on community planning experience and interaction with developers, planners, architects, academics, and community activists. The learning process explored different aspects of community planning through census data analysis, research and evaluation of different development scenarios for the study area, as well as the design of a concept land use plan and planning policy framework.

The work of the students illustrates a vision for *The Edge at Davy Lands*, as well as the conceptual community plans presented to our client—Hopewell Residential Communities—through a series of posters included at the end of this chapter. *The Edge* and *Prairie Skies* conceptual designs incorporate a critical reflection on planning policy tools and instruments to plan and build sustainable communities. We draw on these ideas to present a conceptual community plan for a new community that is compact, transit oriented, and diverse in terms of housing choices and neighbourhood amenities.

## Site Context

The environmental and natural considerations located in the proposed area relate to the glacial meltwater channel of Nose Creek. The Nose Creek watershed area is of 325 km<sup>2</sup> and has an effective area of 217 km. Nose Creek runs from North Municipal District of Rocky View through Airdrie and later joins the Bow River. Due to the sensitive and environmental nature of Nose Creek, there are distinct policies that relate to storm water management, environmental protection, urban design and monitoring. The proposed area of development is currently owned by Hopewell residential Communities, a development company in Calgary.

**Figure 11. 1.** Davy Lands Project Site



The historical land use of the site is primarily agricultural. Currently, there is a working oil well on the site that is not proposed to cease production for at least fifteen years. The oil well creates challenges for cohesive and comprehensive planning and development as well as needs for remediation. The site is bounded to the south by residential communities and largely agricultural activities to the north and west. Davy Lands fall within the Airdrie/MD Rocky View Intermunicipal Development Plan (IDP), as

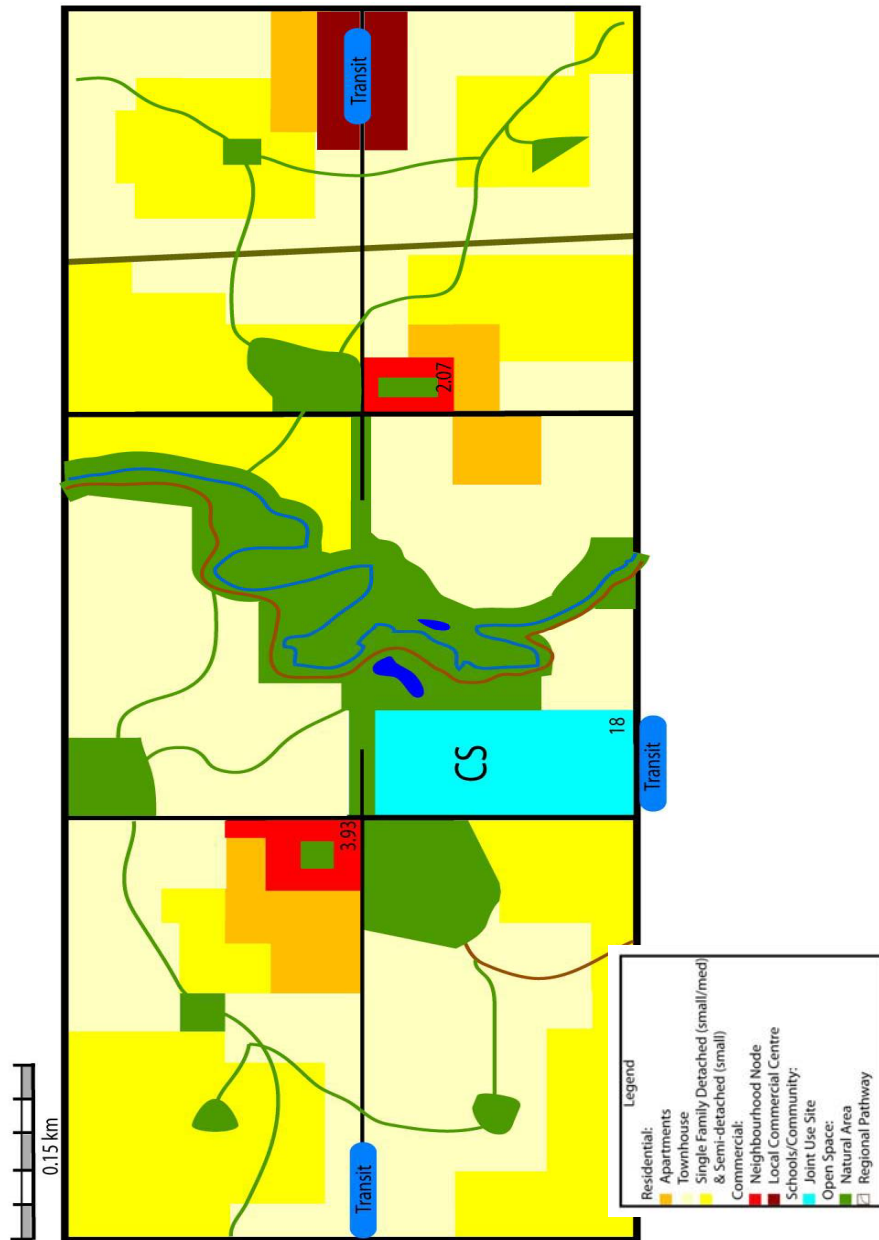
such it must develop in compatibility with the neighbouring communities and the IDP.

Access to local highways and roads is easily facilitated, as the site is serviced by Highway 2 on the east, Highway 567 on the south, 24<sup>th</sup> street NW on the west, and both Main Street and 8<sup>th</sup> Street NW run through the site. Currently, the municipal services, such as sewers, water, electricity and natural gas will need to be linked to the Northeast and Northwest Airdrie communities in compliance with the Airdrie Municipal Development Plan and Land-use bylaws. Furthermore, EMS/Ambulance Services, Fire and Police will be provided by the City of Airdrie.

## Vision

To create a vibrant and diverse community that promotes liveable urban spaces and contributes to the overall social and environmental wellness of the City of Airdrie. The community plan for *The Edge at Davy Lands* community plan is guided by the following objectives:

1. To achieve environmental, social, and economical sustainability through implementing strategic design principles and cohesive planning policies.
2. To ensure safety and accessibility in the neighbourhood as well as pedestrian friendly design.
3. To promote stewardship of the historical context of Airdrie to enhance a sense of place.
4. To create a complete community that is inclusive and affordable by providing a variety of housing typologies.
5. To foster connectivity through the integration of open space, transit, pedestrian, and bicycle pathways.

**Figure 12.2.** *The Edge at Davy Lands Concept Plan*

## Land Use Plan

The concept land use plan for *The Edge at Davy Lands* is presented in Figure 11.2. The community is expected to have close to 8,500 residents with a gross density target of 9 units per acre (UPA). The land allocation is summarised below.

**Table 11.1.** Developable Land<sup>1</sup>

|                                     | Acres            |
|-------------------------------------|------------------|
| <b>Total Land Area</b>              | <b>480</b>       |
| Environmental Reserve (creek)       | 50               |
|                                     |                  |
| <b>Total Gross Developable Land</b> | <b>430</b>       |
| Municipal Reserve 10%               | 43               |
| Schools                             | 16               |
| Community Center                    | 2                |
| Open Space                          | 25               |
| Roads (27%) and Utilities (3%)      | 118              |
|                                     |                  |
| <b>Net Developable Land</b>         | <b>270</b>       |
| Commercial <sup>2</sup>             | 14               |
| Building Footprint                  | 4                |
| FAR .04                             | 10               |
| Residential                         | 257              |
|                                     |                  |
| <b>Gross Density<sup>3</sup></b>    | <b>9.02 UPA</b>  |
| <b>Net Density</b>                  | <b>14.02 UPA</b> |
| <b>Population</b>                   | <b>8536</b>      |

<sup>1</sup> Determination of land allocation was based on the Airdrie City Plan (Municipal Development Plan), the Airdrie Transit Plan (2005-2010), the Reunion Neighbourhood Structure Plan, the Transportation Master Plan (2006), and the Great Places Master Plan.

<sup>2</sup> The amount of commercial retail space in The Edge at Davy Lands was determined by applying the required twenty square feet of retail per person. Given the projected population of the community, the resulting retail floor area is determined to be 170,715 square feet, or 3.92 acres. Including parking, the total amount of land for local retail is determined to be 13.72 acres.

<sup>3</sup> The Airdrie City Plan calls for the overall density for residential land uses to average 5.5 to 9 UPA per net developable acre. However, the Plan also calls for environmental responsibility on the part of the City in order to reduce energy consumption, green house gas emissions, land consumption and waste materials. Moreover, there is a demand in Airdrie for more housing units and a need for more affordable units. As such, it is the intent of this plan to push the UPA beyond the current standards.

## Planning Policy Framework

### ***Environmental Sustainability and Growth***

**Goal:** *The Edge at Davy Lands* will be a leading community in environmental sustainability by providing options for green energy production, environmental stewardship, and development enhances of the natural prairie beauty of the area. Growth in *The Edge at Davy Lands* shall pursue a sustainable growth pattern that incorporates best practice principles of urban design and promotes the use of green infrastructure.

#### **Objectives:**

- To protect and enhance the Nose Creek Natural features.
- To protect the natural grasslands and natural vegetation in the community.
- To ensure that the natural features of the area are kept in their natural state and preserved for future generations.
- To minimize the effects of developments on the environment and provide alternative methods of development to ensure environmental sustainability.

#### **Policy Recommendations:**

1. Future growth and development should meet the requirements of the City of Airdrie Growth Area Management Plan and all other pertinent plans prior to annexation or development near the border of MD Rocky View (City of Airdrie, 2008a).
2. Future growth instruments should also incorporate the use of the Airdrie Growth Study to understand the pertinent implications of growth in Airdrie as it relates to socio-economic policy, downtown retail protection, and lands required to inhabit such growth (ibid).
3. Future developments will abide to neighbouring area structure/ community plans in order to create complete neighbourhoods with regional similarity.
4. Strongly encourage the use of eco-roofs in all building design within the community.
5. Implement green storm water management practices such as storm water ponds and bioswales.
6. Implement porous paving in low-traffic areas, sidewalks and driveways.
7. Create a community composting facility.



### **Housing**

**Goal:** To provide affordable and diverse housing types that suits the needs of all residents. The housing types will encourage an inclusive community by accommodating a broad spectrum of people: those from various socio-economic and cultural backgrounds, age groups, and lifestyles.

**Objectives:**

- To increase the supply and diversity of housing in Airdrie by providing 61% of the housing as multi-family units (low-rise apartments, stacked townhouses, courtyard townhouses and street townhouses).
- To provide a wide array of housing options to suit the needs of people from different socio-economic groups.

**Table 11.2.** Housing Typology and Number of Dwellings

| Housing Typology     |                     |         | %of Housing    | Acres Required | UPA | Units       |
|----------------------|---------------------|---------|----------------|----------------|-----|-------------|
| Apartment            | Low-Rise            |         | 5.00%          | 12.85          | 25  | 321         |
| Multi-Family         | Stacked Townhouse   |         | 15.00%         | 38.56          | 20  | 771         |
| Multi-Family         | Courtyard Townhouse |         | 20.00%         | 51.42          | 18  | 926         |
| Multi-Family         | Street Townhouse    |         | 21.00%         | 53.99          | 15  | 810         |
| Small Single-Family  | Semi-Detached       | 30' lot | 15.00%         | 38.56          | 11  | 424         |
| Small Single-Family  | Detached            | 30' lot | 17.00%         | 43.71          | 11  | 481         |
| Medium Single-Family | Detached            | 40' lot | 7.00%          | 18.00          | 8   | 144         |
| <b>Total</b>         |                     |         | <b>100.00%</b> | <b>257.09</b>  |     | <b>3877</b> |

**Policy Recommendations:**

1. Provide a healthy mix of housing types: mixed use, secondary suites, basement suites, studio spaces and a cooperative housing development
2. Promote intergenerational fusion and be a place for all stages of life .
3. Single family homes (39% of all homes) will be built in various sizes (semi detached, small single family and medium single family units) and on various lot sizes to accommodate a wide spectrum of income levels and personal preferences.
4. Allocate 20% as affordable housing as to include housing for seniors and for lower-income residents.

5. Encourage certain units to remain as rental properties such as cooperative housing with common facilities.

### ***Neighbourhood Nodes and Community Retail***

**Goal:** To provide for local employment and retail opportunities within the *The Edge at Davy Lands* while respecting the wider policy context of maintaining the downtown as the focus of commercial development.

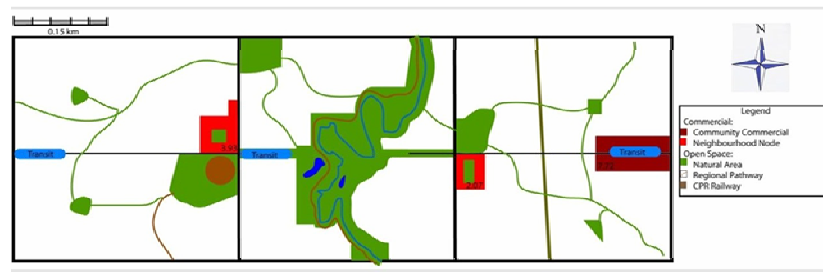
#### **Objective:**

- To provide pedestrian and transit-friendly neighbourhood scale retail.

#### **Policy Recommendations:**

1. Create two neighbourhood retail nodes and one community retail space within the community. The nodes will have an area of 3.93 acres and 2.07 acres, the community retail an area of 7.72 acres with each located within 100m of transit a stop.
2. The FAR of the two neighbourhood nodes and community retail will be 0.4.
3. Pedestrian access to neighbourhood nodes shall be prioritized over other forms of transportation in terms of urban design and siting (City of Airdrie, 2008b).
4. Automobile access should be limited to arterial and major collector roadways (City of Airdrie, 2008b).
5. Parking for the neighbourhood nodes shall be located to the back of retail properties.
6. Neighbourhood commercial nodes shall adhere to the design principles outlined in the City of Airdrie “Mixed Use Centres/Design Guidelines” document.

**Figure 11.3.** Neighbourhood Nodes and Community Retail



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**School and Community Facilities**

**Goal:** To provide *joint use* community facilities for *The Edge at Davy Lands* that make efficient use of land, provide excellent quality service while ensuring they're responsive to the changing needs of the community (City of Airdrie, 2008b).

**Objective:** To provide for one joint elementary/junior high school and community center site in the neighbourhood to provide for the educational and community needs of the two neighbourhoods of *The Edge at Davy Lands*.<sup>4</sup> The joint facility will be easily accessible to serve the needs of all residents in the community.<sup>5</sup>

**Policy Recommendations:**

1. The joint elementary/junior high school and community center site will encompass an area of 16 total acres.
2. The site has an ecology study facility that aids in the teaching of the current curriculum and provides 'healthy' food alternatives from a school site garden which is maintained by the students.
3. The existing barn will be preserved and used for community facilities.
4. Joint school/community facility sites shall be designed and sited in a manner that prioritizes pedestrian access.
5. Joint school/community facility sites shall be sited to ensure that within the community 30% of residences are located within 600 meters of the facilities.
6. Joint school/community facility sites shall have a sufficient number of bicycle racks on site to accommodate 10% of peak-use population.
7. Joint school/community facility sites shall be located within 100 meters of transit stops.

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<sup>4</sup> The following assumptions were used to determine the number and types of schools required in the new community:

-5% of school-aged children do not attend school or are home schooled

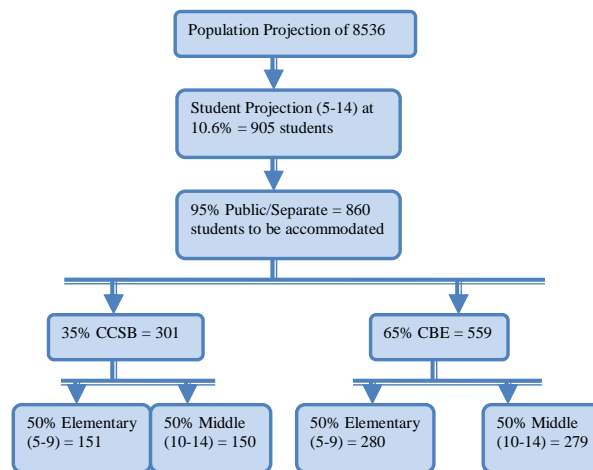
-35% of school-aged children will leave the community to attend school

-school-aged children attending school within the community will be split equally between attendance of elementary and middle school.

<sup>5</sup> Given that the number of students who will attend school in *The Edge at Davy Lands* is approximately 554, and that half will attend elementary and half will attend middle school, and given the population thresholds for these levels of education, one elementary and one middle school is required. Efforts to use land more efficiently as well as generate possible synergies of different community activities indicate that both schools and a community centre can be located on the same site in a joint use facility. The land allocated for the schools is 16 acres, and assumes that the land required for the community centre is an additional 2 acres.

8. Automobile access to joint school/community facilities shall be limited in a manner to prioritize pedestrian, bicycle and transit access.
9. Parking requirements for joint school/community facilities shall meet the parking requirements outlined in the Airdrie Land Use Bylaw (City of Airdrie, 2005). The combined elementary and junior high parking requirements plus exactly one-half of the community center parking requirements will be required.

**Figure 11.4.** School Population Projections



### **Public and Open Spaces**

**Goal:** According to the Airdrie Open Space System Plan the neighbourhood will be “a model of environmental stewardship and a highly valued community asset.” *The Edge at Davy Lands* will provide enhancement of Airdrie’s natural areas and will be designed with a comprehensive open-space network that is synergistic with the public realm and facilitates the development of a walkable, liveable and complete community (City of Airdrie, 2008c).

#### **Open Space Objectives:**

- To ensure that the open space and trail systems are well-integrated within the community (City of Airdrie, 2008c).
- To increase the quality and importance of the open spaces of the community.
- To respect the natural environment and foster stewardship.

- To provide a variety of places for physical activity, recreation, and outdoor enjoyment for the whole community.
- To ensure that the present and future residents will get full benefits of the open space by creating multi-functional spaces near amenities and within walking distance of residential nodes.

**Policy Recommendations:**

1. 10% of the gross developable area shall be provided in the form of municipal reserve.
2. Where possible open-spaces should be connected to form one large space.
3. All open spaces should be connected with other spaces within the community or to the open-spaces pathways of Airdrie.
4. Storm water retention ponds shall be built and used as an enhanced wetland area of Nose Creek and incorporated into the open space system, without compromising the integrity of the creek.
5. Windmill Park can be used to move stagnant water through the area for irrigation of the community gardens.

**Table 11.3.** Open Space Estimates

| <b>Typology</b>                      | <b>acres</b> |
|--------------------------------------|--------------|
| School Lands                         | 16           |
| Community Center                     | 2            |
| Green and Open Space                 | 25           |
| Retention area                       | 1.5          |
| Plazas                               | 2.0          |
| Multi-Use Pathways                   | 5.0          |
| Pocket/Neighbourhood Parks           | 4.0          |
| Community Parks                      | 11.5         |
| Community Garden                     | 1.0          |
| <b>Total Municipal Reserve Lands</b> | <b>43</b>    |

**Public Square and Community Gardens**

**Goal:** To enhance the community's sense of place and create an area that is central where community residents may meet, play, and enjoy their surroundings.

**Policy recommendations:**

1. The public square and community garden is within a maximum of 600m from all areas of the neighbourhood.
2. The public square and community gardens will be accessible and will contain urban Braille where able to.
3. Public square and community gardens will be designed with the principles of CPTED.
4. The square will offer both sun and shade and will provide weather accommodations.
5. Public square will provide multiple uses within the parks, i.e. retail, terrace restaurants, open space for play, small tot playground etc.
6. The community gardens are to promote urban agriculture and food security.
7. Watering of the gardens will be done through storm water reallocation as described in storm water section.

**Figure 11.5.** Open Space and Pathways***Pedestrian Friendly Design***

**Goal:** To design a neighbourhood that offers extensive pedestrian pathways that connect to the many uses of the land, including parks, retail and neighbourhood nodes.

**Policy recommendations:**

1. There must be a safe interface between pedestrian pathways and vehicular traffic.
2. The rule of 400 metres from a transit stop is applied to create viable walking distances.
3. Ensure the roads, buildings, and streetscape are at a pedestrian scale and offer aesthetically pleasing interfaces and a sense of safety.

4. Ensure that any pathway is lit (with low emissions lighting) to enhance safety.
5. Sidewalks should be a minimum of 3.5 meters wide in local retail areas, to promote accessibility.
6. Sidewalks throughout the community must be on both sides of the road and be a minimum of 1.2 m wide and the breadth of the block.
7. Areas near the public square and high retail areas will be pedestrian only with a recommended permit of entrance for delivery trucks, taxis and transit

### ***Infrastructure and Service Provision***

**Goal:** To ensure the reliable provision of water/wastewater, sewage and energy infrastructure while promoting energy and water conservation practices, waste reduction and green infrastructure within the community.

#### **Water/Wastewater**

##### **Objective:**

- To provide for clean, safe water and wastewater infrastructure for the community while promoting water conservation and waste water recycling.

##### **Policy Recommendations:**

1. Provide adequate water and waste water infrastructure prior to any subsequent development.
2. Residential, commercial and institutional buildings are strongly encouraged to adopt water conservation measures such as those recommended in the environmental sustainability plan, e.g. dual-flush toilets, grey-water recycling, use of rain barrels and other rain water harvesting techniques and xeriscaping (City of Airdrie, 2008b).

#### **Storm water**

##### **Objective:**

- To meet the City of Airdrie's requirements for storm water management practices and eliminate storm water runoff into Nose Creek.

##### **Policy Recommendations:**

1. Storm water management practices shall be implemented in the community to eliminate storm water runoff into Nose Creek as per SUDS guidelines (City of Airdrie, 2008b).

2. No channelling of storm water shall exit into Nose Creek or its tributaries (NCWMP, 2008 and City of Airdrie, 2008d); runoff must be caught in retention ponds to reduce the cumulative effects on the creek.
3. A series of bio-swales will be constructed along the pathway system, road medians, road rights of way and other open space areas as a storm water management practice (City of Airdrie, 2008b).
4. A windmill (currently located in the area) will be used to pump water from the storm water retention ponds located near Nose Creek back to the origin of the bio-swale system. This measure will be used to reduce stagnant water accumulation and mosquito breeding (City of Airdrie, 2008b).
5. All driveways, sidewalks, parking lots and low-traffic roads in the community will make use of porous paving technologies to mitigate water runoff during storm events.

**Solid Waste****Objective:**

- To reduce the quantity of solid waste generated in the community destined for landfills while ensuring high environmental and health standards (City of Airdrie, 2008b).

**Policy Recommendations:**

1. Encourage recycling practices through the provision of a curbside recycling program in the City of Airdrie (City of Airdrie, 2008b).
2. Provide community composting facilities at the joint school/community center and free of charge compost to community members.
3. Promote a household goods re-use and sharing program (yard tools, appliances etc) in the community center.

**Energy****Objective:**

- To promote energy efficiency throughout the community while making provisions for local energy production.

**Policy Recommendations:**

1. Require all homes and buildings built within the community to meet the Energuide energy efficiency rating of 85 or above (City of Airdrie, 2008b).
2. Require that the joint school/community center meets the LEED Gold standard for buildings.



3. Create a renewable energy demonstration project on the joint school/community center facility.
4. Implement a community-wide program that allows residents to jointly invest in renewable energy production.

### ***Transportation***

**Goal:** To provide well-designed infrastructure with the capacity to support a successful transportation system offering a convenient alternative to the automobile that is accessible for all citizens.

#### **Destination Oriented Transit (DOT)**

##### **Objective:**

- Encourage DOT in *The Edge at Davy Lands* in line with the city of Airdrie transit system policies. DOT's are established with the intention of creating a Transit Oriented Development in the future.

##### **Policy Recommendations:**

1. Provide transit infrastructure to ensure that residents do not have to walk more than 600m from their homes to reach a transit stop.
2. Provide convenient and safe pedestrian connections made traffic calming measures (i.e. raised sidewalks, medians, decreased automobile speed).
3. Parking should be located to promote walkability and take the focus away from the automobile and towards walking, biking and riding transit.
4. The development of mixed use, high density residential and retail should be increased at main transit nodes.
5. Barrier-free access to transit on the main routes and at transit stops will be promoted.

#### **Road Network**

##### **Objective:**

- To provide a cohesive, interconnected set of roads that will maximize the long-term efficiency and accessibility for a variety of transportation methods. In compliance with the city of Airdrie policies it will accommodate vehicular and non-motorized traffic in a safe, efficient and balanced manner.

**Policy Recommendations:**

1. Ensure the development of arterial, feeder and commuter roads connecting Davy Lands with the rest of Airdrie as well as within the development.
2. The road network will be modelled after a modified grid system.
3. All roads will have designated bike paths or be wide enough to accommodate both automobiles and bicycles safely.
4. The road network will provide accessibility to neighbourhood nodes, areas of employment, community retail nodes, schools, park spaces, other community areas and transit stops.

**Multi-use Pathways****Objective:**

- To decrease the dependence on automobiles by providing a unified, attractive and safe network of pedestrian, bicycle and other multi-use pathways. To create a vibrant, cohesive neighbourhood structure that promotes social interaction.

**Policy Recommendations:**

1. Develop a comprehensive network that provides access to open spaces, park space, schools, commercial nodes, transit, and with connections to existing regional pathway system.
2. Comply with the City of Airdrie's 400m pedestrian accessibility policy.
3. Promote walking, cycling, and other non-motorized activity throughout residential areas.
4. Buses shall be equipped with bike racks to promote transit and bike use.
5. Bike racks should be strategically placed throughout the community.

**Public Transport****Objective:**

- To encourage long-term use of the transit system that ensures a decreased dependence on automobile through well-designed and placed sets of bus shelters and transit stops.

**Policy Recommendations:**

1. High frequency of transit stops to aid in accessibility.
2. Bus shelters designed to suit the character of the neighbourhood.
3. Transit stops will be located in high-density residential areas, employment nodes, schools and community retail nodes.

**Parking****Objective:**

- To provide adequate parking for *The Edge at Davy Lands* community by using innovative urban design principles.

**Policy Recommendations:**

1. Parking availability for all residents, employees and visitors with the possibility of development at nodes once transit becomes widely used.
2. Permeable parking surface materials will be used where possible.
3. Parking lots will be designed to be pedestrian and cyclist friendly with inclusion of bike lock-up areas.

***Environmental Reserve***

**Goal:** Ensure the maintenance, preservation and stewardship of Nose Creek, its riparian edges and floodway/floodplain areas for use by future generations.

**Objectives:**

- To preserve the area of nose creek as a regional asset to the larger community and future generations.
- To reduce urban impacts on a natural watershed.

**Policy Recommendations:**

1. Any land being dedicated as environmental reserve will comply with the Airdrie/MD Rocky View IDP and the Northwest Airdrie ASP recommendations (City of Airdrie, 2008d).
2. Any development within the floodplain and floodway of Nose Creek shall comply with the current land use bylaws of the City of Airdrie.
3. All parcels of land containing Nose Creek shall be incorporated into the surrounding neighbourhoods through regional pathways (City of Airdrie 2008c)
4. There will be a required minimum setback of 15m.
5. Surveys of the riparian vegetation should be conducted and completed on a yearly basis.
6. Mitigation measures shall be followed as per the recommendations of enviroconsult and the West Airdrie Development Plan.

***Oil Well Setback***


The active oil well poses environmental and health impacts of pollution and soil contamination. Due to the dangers of such pollutants, it is necessary that a minimum setback be established.

**Policy Recommendations:**


1. No residential uses shall be permitted within 100 m of the oil well head.
2. After decommission of the oil well, and the effective remediation of soils and lands development may occur within the surrounding area.
3. After decommission of the oil well, the immediate site shall be recognized as an asset of historical value, this shall be enacted to preserve the heritage of Alberta, and the area in accordance to the Airdrie Great Spaces Management Plan.
4. The oil well site will be used for future development of a wind energy farm.
5. During development, the well will be incorporated within the landscape to reduce its obtrusiveness on the landscape.

**References**

- City of Airdrie (2005) *Land Use By-law*, City of Airdrie Planning and Land Development
- City of Airdrie (2006) *Transportation Master Plan*, The City of Airdrie Building and Development.
- City of Airdrie (2008a) *Growth Area Management Plan*, City of Airdrie Supporting Documents, Planning and Land Development.
- City of Airdrie (2008b) *Airdrie City Plan*, City of Airdrie Planning and Land Development.
- City of Airdrie (2008c) *Great Places Parks Master Plan*, Planning and Land Development.
- City of Airdrie (2008d) *Intermunicipal Development Plan*, City of Airdrie Supporting Documents, Planning and Land Development.
- City of Airdrie (2008e) *Growth Study*, City of Airdrie Supporting Documents, Planning and Land Development.
- Nose Creek Watershed Partnership [NCWP] (2008) *Nose Creek Watershed Management Plan*, [Online] Available at:  
<http://www.nosecreekpartnership.com/ncwmp.html>






AT DAVY LANDS



# Regional Context

## Location

- Airdrie is located in South-Central Alberta, just North of the City of Calgary. The Davy Lands are located immediately to the North of the North-West corner of Airdrie.

## SWOT Analysis



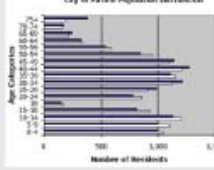
| Strengths  | Weaknesses  |
|--|---|
| Greenfield development means a "clean slate"                       | Oil production on lands with ring as property   |
| Creek has potential of environmental focus of community            | Terrain of land poses some problems with development                                  |
| The surrounding lands have a nice view - not just flat             | Railway division of lands (could be seen as strength for some of place)               |
| Old barns and structures have potential for sense of place         | Main road divide lands  |
| Connecting pathways (roads and natural) are set in place           | Creek division of land  |
| Sloped lands that can help in stormwater runoff control            | Not assessed yet  |
| Infrastructure systems in place                                    | Potentially valuable agricultural land  |
| Opportunities  | Threats   |
| Close to Calgary - transportation                                  | Competition from other parts of Airdrie   |
| Arterial highways are close  | Ballast rail development could be potential competitor to local market                |
| City of Airdrie wants higher density and sustainable community     | Developers focus - retention ponds, single family dwellings and big box retail stores |
| Potential of agricultural land as a community garden or farm lands | Enlargement of main road into a 33 row Connector                                      |
| Potential for creative design and engineering                      | Airdrie land use policies   |

## Population Projection

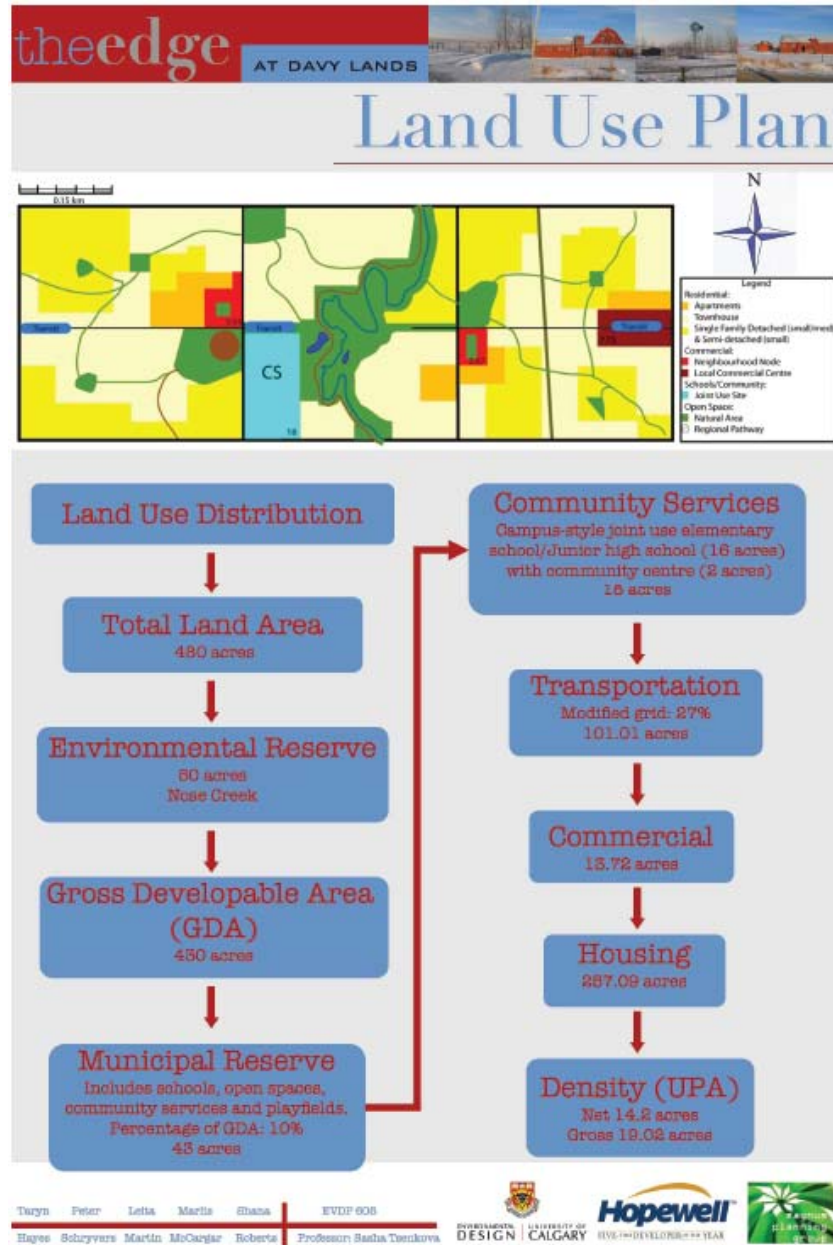
- The annual percentage growth in the City of Airdrie has exceeded 5% over the last 6 years
- in just over 12 years, the population has doubled
- Rapid population growth has put tremendous strain on all aspects of development and has created a housing shortage
- The population boom may be the cause of a significant increase in the construction of multifamily housing within the last two to three years


## Employment & Income

- The unemployment rate in the City of Airdrie for 2006 was 5.1%
- The most popular employment sectors are:
  - Business, finance and administration occupations
  - Sales and service occupations
  - Trades
  - Transport
  - Equipment operators
- Little primary industry or processing employment is located in the city
- The median income for the City of Airdrie in 2001 was \$27,212, a figure which has likely increased to date

|                                 | 2005   | 2010   | 2015   | 2020   | 2025   | 2030   | 2035   |
|---------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Population Projection (rounded) | 15,500 | 25,000 | 30,000 | 37,000 | 42,000 | 45,000 | 46,000 |
| Cumulative Increase from 2005   | -      | 9,500  | 14,500 | 21,500 | 26,500 | 30,500 | 30,500 |
| Dwelling Unit Projection        | 6,800  | 11,200 | 13,400 | 16,300 | 18,200 | 19,000 | 19,000 |
| Cumulative Increase from 2005   | -      | 4,400  | 6,600  | 9,500  | 11,400 | 12,200 | 12,200 |






# Policy Matrix

## Vision

To create a vibrant and diverse community that promotes liveable urban spaces and contributes to the overall social and environmental wellness of the "The Edge" community.



| Policy   | Description  |
|--|--|
| <b>Environmental Sustainability and Growth</b> | <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>1. To promote and enhance the liveability of the community.</li> <li>2. To ensure that the community is a vibrant and diverse community.</li> <li>3. To ensure that the community is a vibrant and diverse community.</li> <li>4. To ensure that the community is a vibrant and diverse community.</li> </ul> <p><b>Goal</b></p> <p>To ensure that the community is a vibrant and diverse community.</p>         |
| <b>Growth</b>                                  | <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>1. To ensure that the community is a vibrant and diverse community.</li> <li>2. To ensure that the community is a vibrant and diverse community.</li> <li>3. To ensure that the community is a vibrant and diverse community.</li> <li>4. To ensure that the community is a vibrant and diverse community.</li> </ul> <p><b>Goal</b></p> <p>To ensure that the community is a vibrant and diverse community.</p> |
| <b>Real Estate</b>                             | <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>1. To ensure that the community is a vibrant and diverse community.</li> <li>2. To ensure that the community is a vibrant and diverse community.</li> <li>3. To ensure that the community is a vibrant and diverse community.</li> <li>4. To ensure that the community is a vibrant and diverse community.</li> </ul> <p><b>Goal</b></p> <p>To ensure that the community is a vibrant and diverse community.</p> |
| <b>School and Community Facilities</b>         | <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>1. To ensure that the community is a vibrant and diverse community.</li> <li>2. To ensure that the community is a vibrant and diverse community.</li> <li>3. To ensure that the community is a vibrant and diverse community.</li> <li>4. To ensure that the community is a vibrant and diverse community.</li> </ul> <p><b>Goal</b></p> <p>To ensure that the community is a vibrant and diverse community.</p> |
| <b>Emergency Services</b>                      | <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>1. To ensure that the community is a vibrant and diverse community.</li> <li>2. To ensure that the community is a vibrant and diverse community.</li> <li>3. To ensure that the community is a vibrant and diverse community.</li> <li>4. To ensure that the community is a vibrant and diverse community.</li> </ul> <p><b>Goal</b></p> <p>To ensure that the community is a vibrant and diverse community.</p> |
| <b>Healthcare</b>                              | <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>1. To ensure that the community is a vibrant and diverse community.</li> <li>2. To ensure that the community is a vibrant and diverse community.</li> <li>3. To ensure that the community is a vibrant and diverse community.</li> <li>4. To ensure that the community is a vibrant and diverse community.</li> </ul> <p><b>Goal</b></p> <p>To ensure that the community is a vibrant and diverse community.</p> |
| <b>Infrastructure</b>                          | <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>1. To ensure that the community is a vibrant and diverse community.</li> <li>2. To ensure that the community is a vibrant and diverse community.</li> <li>3. To ensure that the community is a vibrant and diverse community.</li> <li>4. To ensure that the community is a vibrant and diverse community.</li> </ul> <p><b>Goal</b></p> <p>To ensure that the community is a vibrant and diverse community.</p> |
| <b>Public and Urban Spaces</b>                 | <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>1. To ensure that the community is a vibrant and diverse community.</li> <li>2. To ensure that the community is a vibrant and diverse community.</li> <li>3. To ensure that the community is a vibrant and diverse community.</li> <li>4. To ensure that the community is a vibrant and diverse community.</li> </ul> <p><b>Goal</b></p> <p>To ensure that the community is a vibrant and diverse community.</p> |
| <b>Transportation</b>                          | <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>1. To ensure that the community is a vibrant and diverse community.</li> <li>2. To ensure that the community is a vibrant and diverse community.</li> <li>3. To ensure that the community is a vibrant and diverse community.</li> <li>4. To ensure that the community is a vibrant and diverse community.</li> </ul> <p><b>Goal</b></p> <p>To ensure that the community is a vibrant and diverse community.</p> |
| <b>Environment</b>                             | <p><b>Objectives</b></p> <ul style="list-style-type: none"> <li>1. To ensure that the community is a vibrant and diverse community.</li> <li>2. To ensure that the community is a vibrant and diverse community.</li> <li>3. To ensure that the community is a vibrant and diverse community.</li> <li>4. To ensure that the community is a vibrant and diverse community.</li> </ul> <p><b>Goal</b></p> <p>To ensure that the community is a vibrant and diverse community.</p> |

### Objectives Through Design

- To achieve environmental, social, and economical sustainability through implementing strategic design principles and cohesive planning policies.
- To ensure connectedness to the neighbourhood and the surrounding neighbourhoods of the City of Airdrie through open space connectivity and pathways.
- To promote stewardship of the historical context of Airdrie to enhance a Sense of Place.
- To create a complete community that is inclusive, affordable and comprehensive by providing a variety of housing typologies.
- Open Space connectivity through a 400 m walkable pathway to Nose Creek Open Space and other areas in the neighbourhood.

### Goals

**Bold and Beautiful**

Be a neighbourhood that is bold in its concepts of design and integration and to create a beautiful natural environment that people will enjoy.

**Pedestrian Oriented**

Be a pedestrian oriented neighbourhood that fosters greater connectivity and sense of place through balanced design.

**Safe and Accessible**

Be a neighbourhood that considers the safety and accessibility of local residents and visitors.

**Character and Pride**

Have a distinct character within the neighbourhood that fosters a sense of pride.

**Environmental Stewardship**

Have a clear understanding of the natural environment and guarantee that development contributes to the health and well-being of residents of Airdrie.

**Integration of Open Space**




Have a definitive and comprehensive integration of open spaces, streets, transit, pedestrian and bicycle pathways.

Taryn Peter Leah Marie Rhana


Huges Schuyvers Martin McCargar Roberts


EVUP 606

Professor Sasha Torkova









# Residential Development

## Goals

- To provide affordable, liveable and diverse housing types that suit the needs of all residents.
- The housing types will encourage an inclusive community by accommodating a broad spectrum of people: those from various socio-economic backgrounds, cultural backgrounds, age groups and lifestyles.

### Housing Types

- To increase the supply and diversity of housing in Airdrie, to provide 61% of the housing units as multi-family units: low-rise apartments, stacked townhouses, courtyard townhouses and street townhouses.
- To provide 39% as single family units: small single family - semi detached, small single family and medium single family units.

### Affordability


- To provide a wide array of housing options to suite the needs of people from all socio-economic statuses.

### Co-housing

- To provide secure, affordable housing with a community atmosphere. Focus on sustainability, community interaction and an inclusionary design.

### Housing Density/Diversity


- To encourage sustainable development practices with a goal towards LEED certified building.
- To promote higher density living in an innovative and unique fashion with the goal of 9 U.P.A.




| Dwelling Type                    | Gross Density |
|----------------------------------|---------------|
| <b>Low Density</b>               | 5-8 upa       |
| <b>Single detached on:</b>       |               |
| 60' lots                         |               |
| 50' lots                         | 5 upa         |
| 40' lots                         | 6 upa         |
|                                  | 8 upa         |
| <b>Medium Density</b>            | 11-18 upa     |
| <b>Small Singles on 30' lots</b> | 11 upa        |
| <b>Semi-detached on 30' lots</b> | 11 upa        |
| <b>Semi-detached on 27' lots</b> | 12 upa        |
| <b>Interlots</b>                 | 14 upa        |
| <b>Quattroplex</b>               | 15 upa        |
| <b>Courtyard Townhouses</b>      | 18 upa        |
| <b>High Density</b>              | 20+ upa       |
| <b>Stacked Townhouses</b>        | 20-25 upa     |
| <b>Walk-up Apartments</b>        | 20-25 upa     |
| <b>Low-rise Apartments</b>       | 30-40 upa     |
| <b>Four to eight storey</b>      | 40-80 upa     |


### Design Principles

To create distinct neighbourhoods that suite the needs of all residents and create a cohesive community.









## Commercial

**Goal:**

- To provide for local employment and retail opportunities within the community of "The Edge" while respecting the wider policy context of maintaining the downtown as the focus of commercial development and supporting a north retail node as a complement to this policy.


**Objectives:**

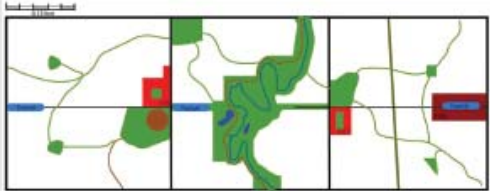
Neighbourhood Nodes


- To provide two separate pedestrian- and transit-friendly, vibrant community-scale retail, institutional and employment areas within the community of "The Edge". These areas are intended to service the neighbourhood retail needs of the community.


Community Retail

- To create a retail area in the community of "The Edge" to meet the community-scale retail needs of the community while not detracting from the commercial dominance of the downtown.











| Required Commercial Acreage              |                |
|--|----------------|
| Commercial Space Required (Sq Ft/person) | 20             |
| Total Population                         | 8536           |
| Commercial Square Footage                | 170715         |
| 1 acre = 43560 sq ft                     | 43560          |
| Commercial Acreage                       | 3.9191         |
| Parking FAR                              | FAR 0.4 9.7977 |
| <b>Total Commercial Acreage</b>          | <b>13.717</b>  |

| Commercial Types       | Acres        |
|------------------------|--------------|
| 1 Neighbourhood Node   | 3.93         |
| 1 Neighbourhood Node   | 2.07         |
| 1 Community Commercial | 7.72         |
| <b>Total</b>           | <b>13.72</b> |








# Community Services and Schools

## Goal

- To provide for community facilities for the community of "The Edge" that make efficient use of land, provide excellent quality of service and connect in appropriate ways to the community while ensuring services provided will be responsive to the changing needs of the community. (Airdrie Plan, 1-1 A.1).




The barn currently located on site will be restored and serve as the community building

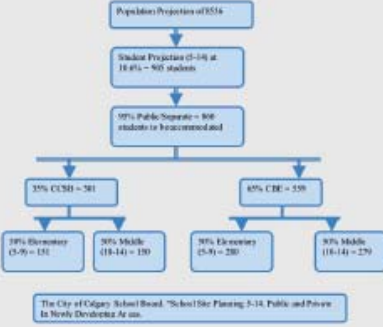
| Allocation of MR (schools, community facilities)                   |              |
|--|--------------|
| Land for schools   | 16.00        |
| Community centres & services                                       | 2.00         |
| <b>Total Joint Use Site</b>  | <b>16.00</b> |
| School Population  | 905          |
| Minus home schooled (5%)   | 860          |
| Minus catholic school (35%)  | 559          |
| <b>Number of children in each school (junior &amp; elementary)</b> | <b>278</b>   |

## Joint School / Community Centers

- Objective:** To provide for one joint elementary/junior high school and community center site in the neighbourhood to provide for the educational and community needs of the two neighbourhoods of "The Edge". The joint facility will be easily accessible to all residents of "The Edge".



The elementary and junior high schools will make use of a shared facility




```

graph TD
    A[Population Projection of 3554] --> B[Student Projection (5-14) at 18.6% = 665 students]
    B --> C[90% Public/Separate = 600 students to be accommodated]
    C --> D[35% CUSD = 210]
    C --> E[65% CBE = 390]
    D --> F[10% Elementary (5-9) = 10]
    D --> G[25% Middle (10-14) = 50]
    E --> H[10% Elementary (5-9) = 39]
    E --> I[25% Middle (10-14) = 98]
    
```

The City of Calgary School Board, "School Site Planning 5-14, Public and Private In Newly Developing Areas"

## Emergency Services

- Objective:** To ensure a safe and secure environment for the residents of "The Edge" through the efficient and rapid provision of police, fire and emergency medical services to the community. (Airdrie Plan, 1-1.C.1).



theedge
AT DAVY LANDS

# Infrastructure

## Goal

"To ensure the reliable provision of water/wastewater, sewage and energy infrastructure while promoting energy and water conservation practices, waste reduction and green infrastructure within the community. To ensure that utilities are located in a manner that maximizes utilization, respects the natural environment and enhances the opportunity for the rights of way to complement the open space system. (Airdrie Plan, 3-1.1)

## Water/Wastewater

**Objective:** To provide for clean, safe water and wastewater infrastructure for the community while promoting water conservation and waste water recycling.

Rainbarrels conserve water and mitigate stormwater effects

## Stormwater

**Objective:** To meet the City of Airdrie's requirements for storm water management practices and eliminate storm water runoff into Nose Creek through a series of storm water management practices by strictly adhering to Sustainable Urban Drainage Systems (SUDS).

A windmill will pump water from stormwater ponds to prevent stagnation

Terraced wetlands can mitigate storm water runoff

## Solid Waste

**Objective:** To reduce the quantity of solid waste generated in the community destined for landfills while ensuring high environmental and health standards associated with solid waste. (Airdrie Plan 1-2.3, 3-4.2).

A compost will be located in the restored barn

## Energy

**Objective:** To promote energy efficiency throughout the community while making provisions for local energy production.

Solar panels can be used as awnings in the retail districts







# Transportation and Open Spaces

---

**Goal:**

- To provide well-designed infrastructure with the capacity to support a successful transportation system that offers a convenient alternative to the automobile.
- The transportation system will focus on affordability and accessibility for all citizens.
- It will be used as a way to travel in and out of the neighbourhood as well as within the community.

**Objectives:**

**Destination Oriented Transit (DOT)**

- Objective - the City of Airdrie wishes to focus their transit system on DOTs to provide residents with a transit system that will facilitate travel from various destinations to their residence.
- DOTs are established with the intention of creating a Transit Oriented Development (TOD) in the future.
- The Davy Lands community will integrate itself into the broader City of Airdrie system and use the higher density, mixed use developments as a model for future TOD.

**Road Network**

- To provide a cohesive, interconnected set of road that will maximize the long-term efficiency and accessibility for a variety of transportation methods. In compliance with the City of Airdrie policies it will accommodate vehicular and non-motorized traffic in a safe, efficient and balanced manner; it will emphasize and accommodate transit use, pedestrian circulation and connectivity within the community.

**Multi-use Pathways (Pedestrians, Cycling and In-Line Skating)**

- To decrease the dependence on automobiles by providing a unified, attractive and safe network of pedestrian, bicycle and other multi-use pathways that will encourage alternative modes of transportation throughout The Edge at Davy Lands.
- To create a vibrant, cohesive neighbourhood structure that promotes social interaction.

**Parking**

- To provide adequate parking for the Davy Lands community by using innovative urban design principles.







## Vision/Policy Matrix

# Prairie Skies

### Creekside Suburban Living

**Professor Sasha Tsenkova**

**Open Space**  
A main priority of Davy Lands is to provide an open space network for public enjoyment of all aspects of community life. Integration of the community open space network into Airdrie's established system is imperative to facilitate connectivity. Another objective is to maximize the amount of the open space in order to provide residents with open spaces for civic enjoyment while also providing green spaces as natural habitat for wildlife. Finally, community memberships are encouraged to be stewards of the open space system.

**Environment**  
Davy Lands strives to be an environmental responsible community. To meet this goal, the community has multiple objectives, including water quality and conservation measures, storm water best management practices, waste reduction and recycling programs, community energy-saving initiatives, local energy production and land stewardship.

Recognizing its regional and local significance to the biophysical and social landscape, Davy Lands wishes to protect the ecological integrity of Nose Creek. To accomplish this goal, the community will protect the ecologically sensitive area of Nose Creek including riparian zones while promoting the creek as a natural amenity for residents to enjoy.

**Community Facilities and Schools**  
The main goal of Davy Lands is to provide the recreational and educational facilities required and desired for the residents of the community. At the same time, available land should be used as efficiently as possible in order to support the enhancement of Airdrie's existing open spaces system. To meet this goal, schools and community centers will occupy the same area to form a community campus. Allowing joint land use for complementary facilities fosters a sense of community while also maximizing land use. Establishment of neighborhood nodes is important to developing a sense of community within each neighborhood, as well as the entire community.

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The collage includes several photographs: a wide open field with a fence, a row of colorful houses, a street view with a sidewalk, a person working in a garden, a view of a creek with trees, and a large red barn-like building. Some images have small text overlays like 'www.flickr.com', 'www.cyburbia.com', 'www.downtownstadium.org', 'www.aconetworks.org', and 'www.flickr.com'.

## Regional Context

# Prairie Skies

## Creekside Suburban Living

Professor Sasha Tsenkova



| Category              | Details  | Comments                                    |
|-----------------------|--|---|
| Overall Project Goals | Develop a suburban living community with a mix of housing types and amenities. | Align with local planning goals.            |
| Site Location         | Adjacent to Nose Creek and Highway 1.  | Strategic location for accessibility.       |
| Community Features    | Include parks, trails, and community facilities.                               | Enhance quality of life and sustainability. |
| Transportation        | Provide access to public transit and carpooling.                               | Reduce traffic congestion and emissions.    |
| Environmental         | Implement green building practices and landscaping.                            | Minimize environmental impact.              |

### 1.0 POPULATION STATISTICS

#### 1.2 AIRDIE POPULATION GROWTH (2006-2007)

| Year | Population | Change | Rate (%) |
|------|------------|--------|----------|
| 2006 | 2,477      | 1,347  | 54.4     |
| 2007 | 3,824      | 1,347  | 54.4     |

\* 2006 Census Data  
2007 Census Data (Airdrie City Plan 2007)

#### 1.3 POPULATION AND GROWTH TRENDS

| Age Group | Population | Change | Rate (%) |
|-----------|------------|--------|----------|
| 0-14      | 1,234      | 1,234  | 100.0    |
| 15-24     | 1,234      | 1,234  | 100.0    |
| 25-34     | 1,234      | 1,234  | 100.0    |
| 35-44     | 1,234      | 1,234  | 100.0    |
| 45-54     | 1,234      | 1,234  | 100.0    |
| 55-64     | 1,234      | 1,234  | 100.0    |
| 65+       | 1,234      | 1,234  | 100.0    |

#### 1.4 HOUSING BREAKDOWN

| Housing Type    | Population | Change | Rate (%) |
|-----------------|------------|--------|----------|
| Single Detached | 1,234      | 1,234  | 100.0    |
| Row Housing     | 1,234      | 1,234  | 100.0    |
| Condominiums    | 1,234      | 1,234  | 100.0    |
| Other           | 1,234      | 1,234  | 100.0    |

### Regional Analysis

To assist in the planning process, demographic and economic information is required to ensure sound decision-making. Population composition, how it changes with time and income levels help determine demand for housing, facilities and services. Growth and housing market trends are particularly useful for developers in determining housing mix.

According to the 2007 Airdrie Civic Census, between 2006 to 2007 population growth rate of change was +5.53%, a net change of 2477 people.

Table: Population growth (2006-2007) (Airdrie Census 2007)

| Category         | Population | Change | Rate (%) |
|------------------|------------|--------|----------|
| Total Population | 31,812     | 2,477  | 7.79     |
| Male             | 15,906     | 1,234  | 7.79     |
| Female           | 15,906     | 1,234  | 7.79     |

The average age range in Airdrie is 30-34, with 95% of the population being under the age of 65 years. This indicates that the city has a young population.

Table: Housing breakdown in Airdrie, 2007

| Housing Type    | Population | Change | Rate (%) |
|-----------------|------------|--------|----------|
| Single Detached | 1,234      | 1,234  | 100.0    |
| Row Housing     | 1,234      | 1,234  | 100.0    |
| Condominiums    | 1,234      | 1,234  | 100.0    |
| Other           | 1,234      | 1,234  | 100.0    |

The Airdrie City Plan (2007) provides a broad policy framework for future land uses for all areas of the City, as well as the design and provision of municipal and other services. An important theme of the plan is growth management. The following is a summary of Plan policies and direction for new developments, which have implications on Davy Lands.

### New Developments:

- Shall be evaluated with the goal of encouraging energy efficiency, resource conservation and sustainability.
- Shall be encouraged to provide access to technology and telecommunication infrastructure necessary to serve home based businesses.
- Shall have energy efficient design and construction.
- Should provide options for innovative residential developments which accommodate secondary suites and other housing alternatives.
- Shall provide linear parkway systems, where possible linking school sites, recreation facilities and major open space areas such as Nose Creek to the rest of the community.
- Are not permitted to create direct runoff into Nose Creek.
- Shall install storm water retention facilities as a means of preventing direct drainage to watercourses.

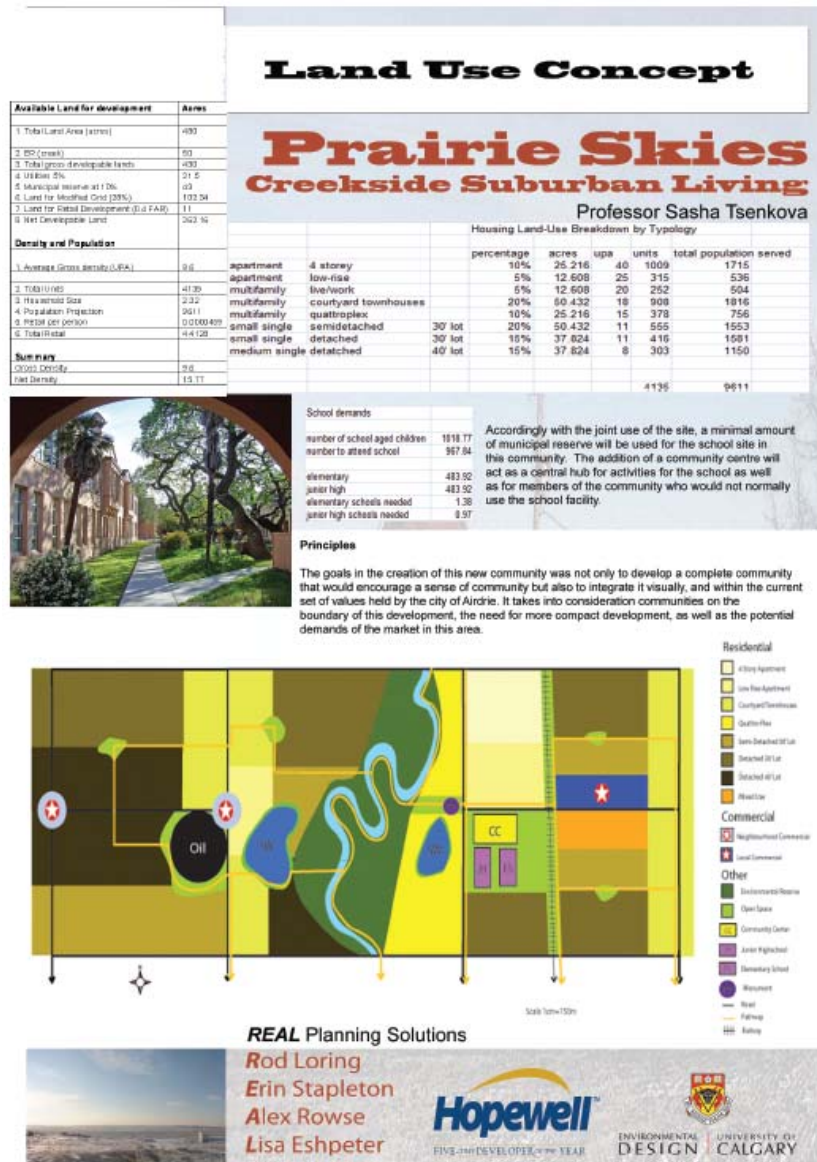
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# Housing

## Prairie Skies Creekside Suburban Living

Professor Sasha Tsenkova



Placement of housing types will be complementary to surrounding setting and land-use.




granny suite on garage

www.cyburbia.org

Back garages will increase visibility to the street and interaction with neighbours.

**Affordability**  
Provide housing for all levels of income to promote a diversity of residents.

**Policy**

- (1) To provide 15% of the projected population with affordable rental housing (based on Vancouver's policy as a precedent).
- (2) Granny units will be zoned into all small and medium single detached residential units.
- (3) 37% of all apartment style units should be affordable (recommended that the City of Airdrie be involved in ownership).



www.fabianarch.com      www.downtownstadium.org

Live/Work units will be placed on the main street area, opposite to the community retail to create a diversity of commercial and residential spaces and a unique looking community.



www.flickr.com

| Unit Type | Range   | Unit Size | Bedroom (N) |
|-----------|---------|-----------|-------------|
| Apartment | 1-2     | 45-55     | 0           |
| Apartment | 3-4     | 55-65     | 1           |
| Apartment | 5-6     | 65-75     | 2           |
| Apartment | 7-8     | 75-85     | 3           |
| Apartment | 9-10    | 85-95     | 4           |
| Apartment | 11-12   | 95-105    | 5           |
| Apartment | 13-14   | 105-115   | 6           |
| Apartment | 15-16   | 115-125   | 7           |
| Apartment | 17-18   | 125-135   | 8           |
| Apartment | 19-20   | 135-145   | 9           |
| Apartment | 21-22   | 145-155   | 10          |
| Apartment | 23-24   | 155-165   | 11          |
| Apartment | 25-26   | 165-175   | 12          |
| Apartment | 27-28   | 175-185   | 13          |
| Apartment | 29-30   | 185-195   | 14          |
| Apartment | 31-32   | 195-205   | 15          |
| Apartment | 33-34   | 205-215   | 16          |
| Apartment | 35-36   | 215-225   | 17          |
| Apartment | 37-38   | 225-235   | 18          |
| Apartment | 39-40   | 235-245   | 19          |
| Apartment | 41-42   | 245-255   | 20          |
| Apartment | 43-44   | 255-265   | 21          |
| Apartment | 45-46   | 265-275   | 22          |
| Apartment | 47-48   | 275-285   | 23          |
| Apartment | 49-50   | 285-295   | 24          |
| Apartment | 51-52   | 295-305   | 25          |
| Apartment | 53-54   | 305-315   | 26          |
| Apartment | 55-56   | 315-325   | 27          |
| Apartment | 57-58   | 325-335   | 28          |
| Apartment | 59-60   | 335-345   | 29          |
| Apartment | 61-62   | 345-355   | 30          |
| Apartment | 63-64   | 355-365   | 31          |
| Apartment | 65-66   | 365-375   | 32          |
| Apartment | 67-68   | 375-385   | 33          |
| Apartment | 69-70   | 385-395   | 34          |
| Apartment | 71-72   | 395-405   | 35          |
| Apartment | 73-74   | 405-415   | 36          |
| Apartment | 75-76   | 415-425   | 37          |
| Apartment | 77-78   | 425-435   | 38          |
| Apartment | 79-80   | 435-445   | 39          |
| Apartment | 81-82   | 445-455   | 40          |
| Apartment | 83-84   | 455-465   | 41          |
| Apartment | 85-86   | 465-475   | 42          |
| Apartment | 87-88   | 475-485   | 43          |
| Apartment | 89-90   | 485-495   | 44          |
| Apartment | 91-92   | 495-505   | 45          |
| Apartment | 93-94   | 505-515   | 46          |
| Apartment | 95-96   | 515-525   | 47          |
| Apartment | 97-98   | 525-535   | 48          |
| Apartment | 99-100  | 535-545   | 49          |
| Apartment | 101-102 | 545-555   | 50          |
| Apartment | 103-104 | 555-565   | 51          |
| Apartment | 105-106 | 565-575   | 52          |
| Apartment | 107-108 | 575-585   | 53          |
| Apartment | 109-110 | 585-595   | 54          |
| Apartment | 111-112 | 595-605   | 55          |
| Apartment | 113-114 | 605-615   | 56          |
| Apartment | 115-116 | 615-625   | 57          |
| Apartment | 117-118 | 625-635   | 58          |
| Apartment | 119-120 | 635-645   | 59          |
| Apartment | 121-122 | 645-655   | 60          |
| Apartment | 123-124 | 655-665   | 61          |
| Apartment | 125-126 | 665-675   | 62          |
| Apartment | 127-128 | 675-685   | 63          |
| Apartment | 129-130 | 685-695   | 64          |
| Apartment | 131-132 | 695-705   | 65          |
| Apartment | 133-134 | 705-715   | 66          |
| Apartment | 135-136 | 715-725   | 67          |
| Apartment | 137-138 | 725-735   | 68          |
| Apartment | 139-140 | 735-745   | 69          |
| Apartment | 141-142 | 745-755   | 70          |
| Apartment | 143-144 | 755-765   | 71          |
| Apartment | 145-146 | 765-775   | 72          |
| Apartment | 147-148 | 775-785   | 73          |
| Apartment | 149-150 | 785-795   | 74          |
| Apartment | 151-152 | 795-805   | 75          |
| Apartment | 153-154 | 805-815   | 76          |
| Apartment | 155-156 | 815-825   | 77          |
| Apartment | 157-158 | 825-835   | 78          |
| Apartment | 159-160 | 835-845   | 79          |
| Apartment | 161-162 | 845-855   | 80          |
| Apartment | 163-164 | 855-865   | 81          |
| Apartment | 165-166 | 865-875   | 82          |
| Apartment | 167-168 | 875-885   | 83          |
| Apartment | 169-170 | 885-895   | 84          |
| Apartment | 171-172 | 895-905   | 85          |
| Apartment | 173-174 | 905-915   | 86          |
| Apartment | 175-176 | 915-925   | 87          |
| Apartment | 177-178 | 925-935   | 88          |
| Apartment | 179-180 | 935-945   | 89          |
| Apartment | 181-182 | 945-955   | 90          |
| Apartment | 183-184 | 955-965   | 91          |
| Apartment | 185-186 | 965-975   | 92          |
| Apartment | 187-188 | 975-985   | 93          |
| Apartment | 189-190 | 985-995   | 94          |
| Apartment | 191-192 | 995-1000  | 95          |

**Goal:** Prairie Skies Community Plan will strive to foster an inclusionary, more compact community by providing affordable housing and a diversity of housing options. The projected density of the Community area is 11.31 units per acre. This density is higher than the current goal of 5.5 to 9 units per acre in the City of Airdrie (Airdrie City Plan 2003); however, it has been shown that denser urban areas are more vital and have higher use if trees and other plants than lower density areas. This density will be achieved through a variety of housing options providing for a diverse community, in accordance with Airdrie's desire to provide "housing developments that provide a range of lifestyle and work alternatives" (Airdrie City Plan 2003).

**Diversity**  
Prairie Skies will offer a range of housing types throughout the community.

**Policies**

- (1) Both neighbourhoods will consist of a combination of housing types to promote diversity throughout the community.
- (2) Housing design will be visually diverse throughout the community.
- (3) The following are suggested housing typologies:
  - i. 4-storey apartment
  - ii. Low-rise apartment
  - iii. Live/work
  - iv. Courtyard townhouse
  - v. Quatroplex
  - vi. Small single semi-detached
  - vii. Small single detached
  - viii. Medium single detached

Townhouse design is to be compatible with school campus and community centre buildings.




www.flickr.com      www.flickr.com      www.homesandcottages.com

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## Commercial Zones



# Prairie Skies

### Creekside Suburban Living

Professor Sasha Tsenkova



The orange zone is designated mixed use with an emphasis on Live/Work units to develop a more diverse and vibrant main street area.






**Small-scale Commercial Development**  
Both the mixed-use centre and commercial neighbourhood nodes will be small in scale to support as much local commercial activity as possible.

**Policies**  
(1) Priority will be given to local independent business over large-scale commercial "big-box" retail.

**Mixed-Use Development**  
Prairie Skies will provide commercial areas where residents can live, work, play and shop.

**Policies**  
(1) Zone for mixed-use development in the commercial areas (east community commercial area and west neighbourhood commercial areas).  
(2) The neighbourhood mixed-use developments will be located on what is presently Range Road 12 as well as on Range Road 13.  
(3) The community mixed-use centre will be located on Prairie Skies Boulevard.  
(3) Uses for the community mixed-use centre may include: retail, non-retail, office space, restaurants, cafes, grocery store or market, and community services.  
(4) Uses for neighbourhood mixed-use centres may include: retail, non-retail, office space, small restaurants, cafes and residential units.

Images represent mixed use walkable community and neighbourhood commercial districts. Retrieved from [www.flickr.com](http://www.flickr.com)

Goal: To provide an economically viable mixed-use area centrally located, with accessible local neighborhood commercial areas.

The Prairie Skies Community is primarily residential; however, with a projected population of 9611 people it is reasonable to provide diverse commercial activity within the community (Barton, Grant and Guise 2003). The majority of commercial activity will be provided in the community node, along Prairie Skies Boulevard. The remainder will be located in the west neighbourhood node. All residents will have access to commercial areas within 400-800 meters.


Mixed-use development reinforces the viability of centres, and establishing various uses provides multiple reasons for people to go and stay in the centre, as well as gives residents the benefit of being able to walk a short distance to get groceries or household items or see a movie. In addition, mixed-use development provides the opportunity for individuals to live and work in closer proximity (Barton, Grant and Guise 2003).



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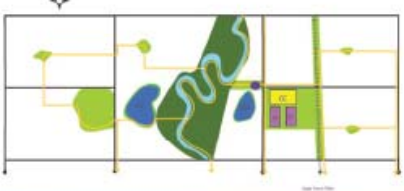
## Open Spaces

# Prairie Skies


### Creekside Suburban Living

Professor Sasha Tsenkova


Prairie Skies Parks and Pathway system



The community will include an extension of the open spaces system already in existence in Airdrie which will extend bicycle and walking paths as well as connect the open spaces that will be preserved in this new community.




www.flickr.com




www.flickr.com

The pathway system acts as a connection between the east and west sides of the community without having to build a vehicle bridge over the protected area around the creek. It is important that this area be usable by residents so it is accessible by foot or bicycle to approach, cross and travel beside in order to enjoy it without compromising its health and encouraging flourishing biodiversity.


Current pathway system from www.airdrie.ca




Parks & Pathways



www.flickr.com




www.flickr.com




www.flickr.com

Open spaces were determined by using the remaining land area from the municipal reserve after accounting for land area needed for the schools and community centre. These areas were dispersed through the community around residential areas and areas considered important for future preservation.

The pathway connects from the school campus site through the historical barn feature in the centre of the community. This feature is a recycled building from the original Davy Lands site which celebrates the history of the area as well as creates a monument which can help to create a sense of community and belonging in the new residents of Prairie Skies




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## Environment

# Prairie Skies Creekside Suburban Living

Professor Sasha Tsenkova

Map of open spaces, creek with environmental reserve and open space surrounding as well as storm water retention ponds

### Environment

Goal: To promote environmental responsibility and to protect the ecological integrity of Nose Creek.

### Objectives

Water: To implement water quality and conservation measures.

Storm water: To implement storm water best management practices to maintain watershed and human health.

Land stewardship: Davy Lands encourages residents to be stewards of the land, including celebrating historical use of the land, maintaining natural topography and understanding the ecological and recreational importance of Nose Creek riparian zones.

Possible pedestrian passage over Nose Creek

All images retrieved from [www.flickr.com](http://www.flickr.com) showing possible functions of the riparian areas around Nose Creek and the storm water management ponds.

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## Environment

# Prairie Skies

### Creekside Suburban Living

Professor Sasha Tsenkova



[www.acenetworks.org](http://www.acenetworks.org)



[www.swinny.net](http://www.swinny.net)



[www.soldier.org](http://www.soldier.org)



[www.reidtechnology.co.nz](http://www.reidtechnology.co.nz)



[www.nodc.gov.uk](http://www.nodc.gov.uk)

**Environment**  
Davy Lands strives to be an environmental responsible community. To meet this goal, the community has multiple objectives, including water quality and conservation measures, storm water best management practices, waste reduction and recycling programs, community energy-saving initiatives, local energy production and land stewardship.

Recognizing its regional and local significance to the biophysical and social landscape, Davy Lands wishes to protect the ecological integrity of Nose Creek. To accomplish this goal, the community will protect the ecologically sensitive area of Nose Creek including riparian zones while promoting the creek as a natural amenity for residents to enjoy.

**1. Water**  
Storm Water, retention ponds

**2. Waste**  
Conservation, recycling

**3. Land Stewardship**  
Preservation, urban agriculture

**4. Nose Creek**  
Riparian areas, set-backs



[www.grow-ars.information.com](http://www.grow-ars.information.com)



This map shows all environmental reserve, retention ponds and open spaces

**REAL Planning Solutions**


Rod Loring  
Erin Stapleton  
Alex Rowse  
Lisa Eshpeter



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## Transportation

# Prairie Skies

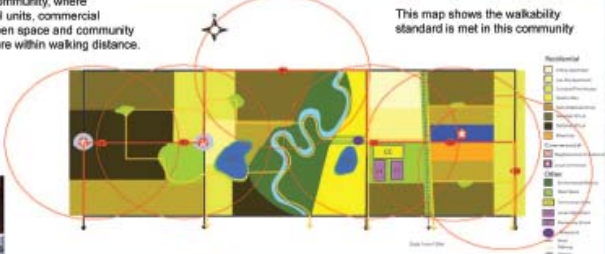
### Creekside Suburban Living

Professor Sasha Tsenkova




**Pedestrian Friendly**  
Prairie Skies will be a pedestrian friendly community, where residential units, commercial nodes, open space and community facilities are within walking distance.


[www.flickr.com](http://www.flickr.com)  
[www.homesandcottages.com](http://www.homesandcottages.com)




This map shows the walkability standard is met in this community



[www.globelexchange.com](http://www.globelexchange.com)



[www.thetransitcoalition.com](http://www.thetransitcoalition.com)




Airdrie's current public transportation route

**Transit Oriented Development**  
To facilitate a future transit system, this community will be transit-oriented.


**Policies**  
(1) All development will accommodate and encourage future public transit usage.  
(2) Parking accommodation/facilities will be minimized in commercial areas/community and neighbourhood nodes in order to promote transit and pedestrian use/access.  
(3) Transit stops shall be no more than 400 meters walking distance from residences.  
(4) Highest density development will be zoned along transit routes.

**Alternative Forms of Transportation**  
Alternate forms of transportation will be encouraged, including walking, cycling, car-sharing, rollerblading, skateboarding etcetera.


**Efficient Road Network**  
Provide adequate road infrastructure to maximize connectivity between neighbourhoods and within community, while minimizing the role of the automobile.




[www.richmond.ca](http://www.richmond.ca)




[www.cs.ttu.edu](http://www.cs.ttu.edu)




[www.flickr.com](http://www.flickr.com)



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## Urban Design

# Prairie Skies

### Creekside Suburban Living

Professor Sasha Tsenkova

**Urban Design**  
Goal: To create a sense of place through traditional design style and historical preservation while also incorporating newer design concepts for a universally appealing esthetic.

**Objectives**  
Community Identity – To incorporate traditional western prairie style and color palette and use the former barn as an historical landmark.  
Universal – To make the community a place to be enjoyed by all, with accessible entrances, safe street crossings and wide sidewalks.  
Pedestrian-friendly streetscapes – To create streets that cater to the pedestrian, with tree-lined boulevards, pedestrian-friendly buildings, small setbacks, unobstructed views, good materials and separation of vehicular and pedestrian traffic.  
Green – To create a green community full of natural plant life, including xeriscaping, greenways and open spaces.  
New Urbanism – To implement elements of new urbanism, including back lanes, rear garages and front porches.

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