

Sustainable Neighbourhood Design

- A Case Study of the Southeast False Creek(SEFC) Urban Neighborhood Design Project -

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ABSTRACT : This research attempts to draw out transferable lessons for future sustainable neighbourhood design(SND) by analysing a cutting edge Canadian practice towards sustainable urban neighbourhood design, the Southeast False Creek(SEFC) Project. This paper discusses the importance of neighbourhood planning and design in modern urban life, and analyses the SEFC project's progress towards sustainability through in-depth analysis of the planning and design strategies and technologies adopted. The results indicate that, overall, the SEFC project could achieve a significantly higher level of progress towards sustainability in most of the evaluation criteria compared to conventional urban neighbourhood development practices in Canada. However, some limitations are still apparent in the aspect of 'soil safety and decontamination'. In addition, the research suggests that there exist sustainability implementation barriers within current planning and design practices, and highlights the need for setting sustainability targets, indicators and benchmarks at a very early stage in order to prevent potential conflicts between key actors and thereby hinder progress towards sustainability.

Key Words : Sustainable Development, Neighborhood Design, Sustainability Evaluation

요약 : 리우선언(1992) 이후 21세기 지구환경시대의 새로운 패러다임으로 등장한 지속가능한 개발(Sustainable Development)은 지구의 환경용량 내에서 개발을 추진함으로써, 삶의 질을 높이고, 급속한 도시화와 과도한 개발로 인한 환경적, 사회적, 경제적인 문제점을 극복하고자 하는 시도이다. 최근 신도시 건설, 주거단지개발, 개별건축물 설계에 이르기까지 구체적인 실천방안을 찾기 위한 다양한 실험과 연구들이 진행되고 있다. 본 연구는 지속가능한 근린주구 개발을 목표로 구체적인 목표와 계획지침을 제시하고 시범사업을 통해 개발모형을 구체화하고 있는 캐나다 밴쿠버시의 Southeast False Creek 프로젝트 사례 연구를 통해 지속가능한 개발의 원칙이 어떻게 적용되고 있으며, 실현과정 속에 어떤 문제점이 존재하는지를 고찰하고 지속가능한 근린주구 계획 추진을 위한 시사점을 도출하고자 한다. 이를 위해 우선 현대사회에 있어서 근린주구 계획의 필요성을 고찰하고, 지속가능성 평가 틀을 만들어 SEFC 프로젝트의 지속가능성을 평가하였다. 그리고 프로젝트

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의 진행과정 속에서 표출된 문제점을 분석하였다. 연구결과 SEFC 프로젝트는 오염토양으로 인한 토양의 안전성 측면을 제외하고 토지이용, 교통, 에너지, 물, 식생, 쓰레기 처리, 커뮤니티 등 많은 관점에서 높은 수준의 지속가능성을 확보하고 있는 것으로 분석되었다. 또한 지속가능성을 추구하는데 있어 구성원들의 의견차이, 사업성 확보문제, 재원부족, 주민참여 문제 등 다양한 문제점이 존재한다는 점을 파악할 수 있었다. SEFC 프로젝트의 가장 큰 시사점은 이러한 문제점을 극복하고 지속가능성을 확보하기 위해서는 계획 초기부터 시민, 전문가, 관련 공무원들이 공동으로 참여하여 지속가능성 확보를 위한 구체적인 계획목표와 체계적인 평가시스템을 구축하고 모니터링을 통해 전략적 발전을 추구해야 한다는 점이다.

주제어 : 지속가능한 개발, 근린주구계획, 지속가능성 평가

I. Introduction

As residents increasingly voice their demands for better quality living environments via Local Agenda 21(LA21) initiatives and government advocates quality and sustainability in design, many experimental urban or rural housing and neighbourhood¹⁾ planning and design projects have been encouraged worldwide to promote sustainable settlement development(e.g. the Urban Village, New Urbanism and Ecovillage Movements).

However, there are very few signs of

actual change on the ground. Most new developments repeat the patterns of the recent past, i.e. facilitate car use, disenfranchise non-car-users, and provide the essential services of water, sewage treatment, gas and electricity on demand rather than attempt to manage demand or to achieve local autonomy(Barton, 2000). Furthermore, there has been a lack of research analysing or evaluating their progress or achievement towards sustainability at the local(i.e. neighbourhood) level. Consequently, no significant progress towards sustainable neighbourhood design²⁾ has been observed on a consistent

1) The term 'neighbourhood' is a contested one and what its meaning can vary considerably(Keller, 1968). Consequently, no one definition has come into widespread acceptance among neighbourhood residents, neighbourhood organisations, or academic analysts(Downs, 1981), and people frequently cause confusion by shifting their terms of reference from one to another, without explicit definition. In this study, a holistic view of neighbourhood(neighbourhood as a functional unit, a place and a locus of community) and Barton's ecosystem approach(1995 and 2000) are adopted because by planning and designing neighbourhood as a partially 'self sufficient' ecosystem many social and environmental problems(e.g. social segregation, environmental disasters, etc.) can be averted. Therefore, in this research the term 'neighbourhood' is defined as a walkable residential or mixed use area(or place), within which residents share basic facilities and have easy access on foot(400~800 m) to basic facilities and services(e.g. school, shops, community centre, etc.).

2) This research defines the term 'sustainable neighbourhood' as a walkable neighbourhood within which a mix of people can live(without segregation), maximize their quality of life, enjoy social interaction and partial 'self-sufficiency' in basic facilities(e.g. homes, jobs, food shops, schools and post offices), resources(e.g. energy, water, waste and building materials) and decision-making(e.g. design and management), and experience minimal negative effects, whether social or environmental, thus

basis worldwide.

To further and assist sustainable neighbourhood design this research discusses the value and usefulness of neighbourhood planning and design concept towards sustainability, considers the factors that have encouraged or limited its implementation, and attempts to draw out transferable lessons for future sustainable neighbourhood development by analysing a cutting edge project towards sustainable neighbourhood design, the Southeast False Creek Sustainable Urban Neighbourhood Design(SEFC) Project. The paper begins by discussing the significance of neighbourhood planning and design in modern urban life. It continues by explaining the key research methodology and evaluation framework adopted. It then analyses the ultimate proposals in the "Southeast False Creek Policy Statement: Toward a Sustainable Urban Neighbourhood and a Major Park in Southeast False Creek" with the original proposal for a conventional large-scale condominium development on the project site, proposed by Stanley Kwok, the master-planner of False Creek North. Finally, it analyses key factors influencing the project's performance and points to key lessons to be learnt from its planning and design process

by means of interviews with key actors (i.e. planners, architects and developers) and secondary data(e.g. evaluation reports, journal and newspaper articles, etc.).

II. Significance of Neighbourhood Planning and Design in Modern Urban Life

Neighbourhood planning and design, stemming from Ebenezer Howard's Garden City concept(dated 1898), has been the focus of attention of city planners, architects, urban designers and social analysts for many years(Kallus and Law-Yone, 2000; Patricios, 2002). It is often considered a solution to urban social problems, resulting from the deterioration in local community ties(Kallus and Law-Yone, 2000). However, it has been severely criticised for its emphasis on the physical rather than social environment(Madanipour, 2001). It received a particularly bad press from the social analysts of the 1960s and 1970s who equated it with social engineering the artificial creation of a community by design-which they observed did not accord with the reality of individual and social behaviour in an increasingly mobile age. They further argued that it was based on false

benefiting both local residents and society at large. Therefore, sustainable neighbourhood design can be defined as a planning and design attempt to create a sustainable neighbourhood well integrated with its context, while protecting and enhancing the environmental, social and economic health of its community, without significantly raising costs or diminishing the quality of life.

perceptions of the designer's role and power, and the relationship between people and space(Barton, 2000; Madanipour, 2001). Thus, many researchers(e.g. Taylor, 2000; Downs, 1981; Keller, 1968; Isaacs, 1948) contended that neighbourhood planning and design was a concept whose time had passed.

Notwithstanding, neighbourhood(as a locality /place where people live) is still a relevant concept in planning and design for many compelling reasons. Barton(2000) identified ten reasons why neighbourhood planning and design is a desirable and feasible concept: it can cut greenhouse gas emissions, close local resource loops, enhance local environmental quality, create a healthy environment, and increase street safety, accessibility and freedom of choice, equity and social inclusion, local work opportunities, the value of the local community, and local self-determination. The present researcher believes that 'neighbourhood' planning and design is an appropriate and practical scale to: 1) counteract the trends towards placelessness, car-oriented lifestyles and virtual communities; 2) implement comprehensive and holistic planning and design strategies/ technologies to minimise social, environmental and economic problems; 3) manage potential conflicts in the decision-making process which give rise to time, cost and resources inefficiencies; and 4) maximise the sustainability of human

settlements. Even though many people's lives are not lived in neighbourhoods in the modern city, and non-localised forces and lifestyles predominate, it still remains the case that local neighbourhoods give people (especially the old, young, less affluent and less mobile) the opportunity to feel they belong to(or perhaps have no other choice but to identify with) a local community, although the sense of belonging and the scale of community may vary in place and over time. Moreover, even if nothing can be done to bring about more local lifestyles, there remain good environmental reasons for trying to resist the non-localising trends of modernity. For example, various environmentally friendly initiatives can be pursued at the local level(e.g. local CHP plants, the recycling of organic waste and refuse, etc.) to help minimise environmental crises and avoid natural resources' depletion. As Barton(2000) points out, the case for reinventing neighbourhood planning does not rest on whether or not people feel part of a local community, but on giving them the option and opportunity to think and act local, to work, cycle, meet on the street and in the square, features which are significantly reduced or missing in recent car based urban settlements. Finally, neighbourhood planning is an ideal arena for public action through citizen participation. When public

citizens or local residents have opportunity or obligation to manage their own water supply, sewage garden, CHP plants etc. greater public participation in decision-making can occur. Level of violent crime and vandalism also appear to be reduced by strong community participation (Worpole, 1998; Gilchrist, 2000). Kallus and Law-Yone (1997) points out that the neighbourhood is an ideal scale for realising the idea of public participation because its scale, less complex than the entire urban system, and its social and physical measures offer a potential for communal collaboration and decision-making. For all these reasons, neighbourhood planning and design has a significant role to play in contributing to sustainability.

III. Research Methodology and Evaluation Framework

A case study approach was selected in this research because it is the preferred strategy when “how” or “why” questions are being posed, when investigator has little control over events, where a large-scale survey is not possible, and when the focus is on a contemporary phenomenon within some real-life context (Yin, 1994). <Table 1> presents a sustainability evaluation framework, which was devised and applied throughout the case study analysis. A three-

stage analysis process was adopted. Firstly, this research conducts a comprehensive analysis of the project’s sustainability progress through comparison with the Kwok’s original proposal (an example of well-designed, compact, high-rise, high density development in Vancouver), using the sustainability evaluation framework established. Secondly, in order to analyse key lessons that emerged during the planning and design process, the researcher conducted semi-structured interviews with key actors (planners, academic professionals, architects and developers) involved. A total of eight professionals (2 planners, 4 academic professionals and 2 architects) were interviewed between November 1999 and January 2000. Personal e-mail contacts and interviews were also undertaken to gain an in-depth understanding of key barriers and lessons, before and after the field trip and interview stage. Finally, documentary analysis (newspaper articles, journal articles and project reports, etc.) and field observations were conducted to gain further in-depth understanding of the actual project context (or barriers). The interviewees remained anonymous to maintain confidentiality, but broad descriptions of interviewees’ job/ position are provided.

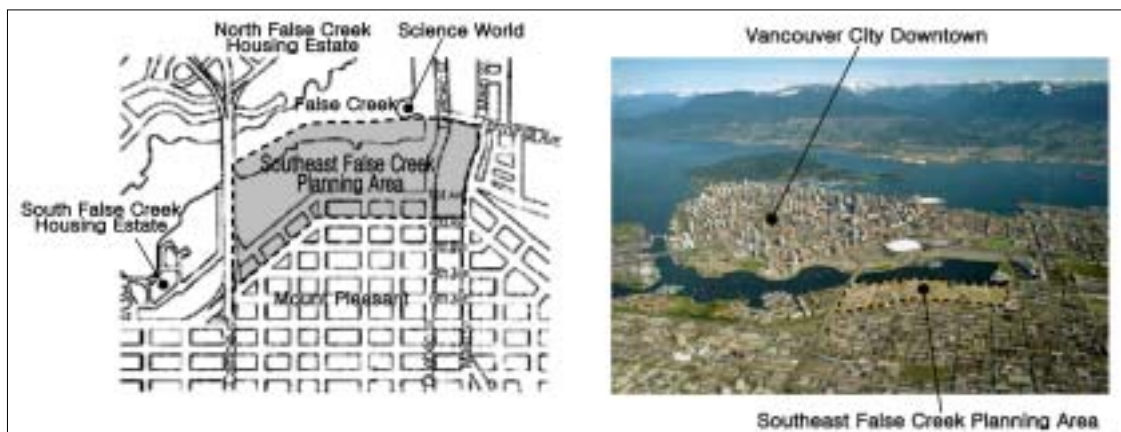
〈Table 1〉 Evaluation Framework

Evaluation theme	Detailed evaluation criteria
Land use & transportation	Density, proximity of housing to key activity centers, pedestrian, bicycle and transit amenities, accessibility and safety of public transportation
Energy	Non-renewable energy consumption, diversity of energy resources used, renewable energy generation
Air	Green house gas emissions, quantity and quality of tree cover, chemical and biological contaminant emissions
Water	Water consumption, site's imperviousness, local sewage treatment capacity
Soil	Soil productivity, soil safety and decontamination
Flora & fauna	Habitat creation, vegetative land, roof area designed to carry out plant life.
Built form	Housing types, dwelling units with good solar orientation, safety, anti-crime design strategies adopted.
Waste recycling	Waste generation, organic waste processed, materials recycled/salvaged
People & community	Affordable housing provision, public participation in planning and management of site

IV. Case Study

1. Project Description

In 1990, Vancouver City Council adopted the Clouds of Change Report which recommended that new development in the city strive towards making any development more energy efficient by reducing the use of greenhouse gases, through good planning, and encouraging people to make more use of alternative modes of transportation. This included bringing housing and employment closer together, increasing housing adjacent to the downtown core and ensuring the principles of energy efficient community design principles were incorporated into the planning of the SEFC project. The City Council endorsed a planning process to explore the potential for environmental sustainability and energy efficiency principles,



〈Figure 1〉 Site Map and Aerial Photo(Source: City of Vancouver, 1999, p.4)

and decided to develop the SEFC project as a model of an energy-efficient, ecologically-appropriate, transit-oriented sustainable community.

The site is approximately 36 hectares of former industrial land on the False Creek waterfront on the southern edge of downtown Vancouver. The majority of the land in the study area north of 1st Avenue is City owned. The study area also includes over 13.6 hectares of privately owned land, between 1st and 2nd avenue to the south and between 1st Avenue, Quebec Street, Terminal Avenue and Main Street to the east. It is located close to the community of False Creek North(former EXPO 86 land) and Science World(one of the buildings of the former EXPO 86) to the north, South False Creek to the west, the Mount Pleasant Industrial Area to the south and the False Creek Flats Industrial area to the east(see <Figure 1>). Historically, it has been used for a variety of heavy industries, including shipbuilding, garbage incineration, an asphalt plant, sawmill and steel fabrication. According to a preliminary survey carried out for the city in 1992, there were large variations in the cost of cleaning-up the site for re-development, somewhere between \$15 million (for a residential development removing contaminated soils only where necessary) and \$150 million(to completely remove all

the contaminated materials from the entire site).

The planning process for such areas in Vancouver comprises a special cooperative planning process which includes the creation of a policy statement to guide development planning, the creation of an official development plan(ODP) and, finally, re-zoning of the land to permit development in accordance with policies. The project continues through the aforementioned planning and design processes. A final draft SEFC Policy Statement was adopted by the City Council in October 1999. The city has been working towards establishing the ODP of the project since May 2000.

The city's Real Estate Division is the site's major landowner. Its principal objectives are to maximise its Property Endowment Fund established on June 17, 1975, and to support the City's potential objectives by maximising economic profits and minimising the risks of development. It selected Stanley Kwok, the development coordinator of False Creek North, to undertake a feasibility study on June 11, 1996. Kwok and his design team, Baker McGarva Hart Architects, submitted a full-colour, 74 page plan for conventional high-density(1.6 gross/3.13 net FSR) urban neighbourhood design on January 1997, which incorporated the concepts of compact and transit-oriented development

with a large amount of public parks along the waterfront walkway. However, Kwok's proposed plan focused heavily on the economic returns from the development and failed to meaningfully address council policies for a sustainable neighbourhood community on the site. Blore(1997) commented, "it bore more than a passing resemblance to the tower of Concord Pacific..... Sustainability-supposedly one of the development's guiding ideals-had been written off in a single page". Citizen and community groups(e. g. the SEFC Working Group and the Environmental Youth Alliance) also actively protested against Kwok's proposed plan and criticised its lack of sustainability concerns.

Largely in response to the aforementioned public input, a broad coalition of community, social justice, and environmental groups, the council and the City of Vancouver Planning Department(CoVPD) decided that Kwok's plan was too tightly focused on economic factors and did not take into account social and environmental concerns(Irwin, 1997). The Council and CoVPD therefore approved contracting a multi-disciplinary consultant team(led by The Sheltair Group Inc.) who produced a comprehensive consultation report: "Vision, Tools and Targets: Environmentally Sustainable Development Guidelines for SEFC" between October 1997 and April 1998. This report identified the concepts of

sustainable development, established a set of project goals, objectives, targets and indicators and developed a full cost accounting method. The CoVPD organised the SEFC Design Charrette for investigating the in-depth opinions of professionals and the application possibilities of innovative ideas, and guiding the day-to-day planning and development process in order to control the profits-oriented approach and incorporate concepts of "sustainability" within the site.



〈Figure 2〉 Kwok's original proposal(Kwok, 1997)

2. Design Goals, Targets, Strategies, Indicators And Their Implementation

The following section analyses the SEFC Policy Statement(including the performance targets and findings of the SEFC Design Charrette), and evaluates the progress of the project towards sustainability through comparative analysis with Kwok's original proposal for the site.

1) Land Use and Transportation

Compared to Kwok's original proposed plan for the site, one of the most valuable achievements of the SEFC Policy Statement is that the aspect of mixed land use is clearly incorporated as a key design strategy. It is recommended that:

The land-use pattern in the SEFC project will offer diverse opportunities for residents to live, work, learn and play in a livable neighbourhood. As a complete, mixed-use neighbourhood, the SEFC project will promote social interaction, community building, a prosperous local economy and reduced dependence on private automobile use.

(CoVPD, 1999, p.9)

In fact, larger amounts of land are designated for mixed land use compared to Kwok's proposed plan which suggested up to 7,214 m² of retail space. A total 18,600m² of commercial or industrial use and live-work and work-live policies are incorporated in the SEFC Policy Statement. Moreover, the privately owned land between 1st and 2nd Avenue is clearly designated for live-work space and existing clean industrial use is encouraged and retained, and/or gradually replaced by retail and service, live-work or residential uses. The development of adequate food-oriented retail(including a major food store) and community facilities are also encouraged in or adjacent to the SEFC project area. In addition, in comparison to

Kwok's original proposal for park space (7.5ha), the SEFC project provides a significantly larger area(10.7ha), almost twice larger than the city's standard(1.1. ha/1,000 persons).

In relation to transportation policy, similar levels of concern led to design strategies being put in place for establishing convenient and safe pedestrian access, waterfront walkway-bikeway and access to public transits in both the SEFC Policy Statement and Kwok's original proposal plan. Indeed, a good quality street network, pedestrian friendly walkway-bikeway(with a 10.7m width, similar to False Creek North) and two modes of public transport connection (street car and ferry) were incorporated in Kwok's planned proposal. However, one major difference between the SEFC Policy Statement and Kwok's proposed plan was the former's strengthened concerns for telecommuting facilities and live-work options as trip reduction measures whereas these were lacking in the latter.

Notwithstanding, the SEFC Policy Statement failed to reduce the level of car park provision, despite the site's location near the downtown area with good transport connections, because of the landowner's fear that housing units would remain unsold without adequate car parking provision. Further, soil and water-table contamination

halted the provision of underground parking facilities, which was the preferred choice.

2) Energy

Compared to Kwok's original proposal, serious concerns and strong support for energy sustainability were incorporated in the SEFC Policy Statement which recommended that:

The City should develop an energy efficient plan for the SEFC project in consultation with BC Hydro and the developer in aspects of renewable energy technology, regulatory issues, building and infrastructure design, cost, landscape design..... the city should consider the possibility of using city-owned buildings as sites for demonstration projects featuring advanced energy-efficient design.

(CoVPD, 1999, p.61)

The Statement refers to various possible ways of reducing energy consumption and increasing the use of renewable energy resources. However, nothing has been specified as yet because the policy statement failed to set further detailed design targets and strategies for renewable energy resources and energy saving methods. Nevertheless, the SEFC Design Charrette provided sufficient evidence to conclude that the SEFC project could achieve significant progress in aspects of energy efficiency and the use of renewable energy resources. Team 2 estimated 50% ~ 60% of domestic hot water could be

supplied by solar energy (from the tops of mid-rise roofs and sides of towers facing SE to SW) as a result of building orientation and design. Team 3 proposed several innovative ideas, i.e. using wind for natural ventilation and cooling; maximising the solar collection surface; incorporating building-integrated photovoltaics; using ground source heat pumps for 2 and 3-storey buildings; and incorporating neighbourhood heating systems. Team 3 estimated that 25% ~ 40% of the energy consumption could be delivered by renewable energy generated on the site. Notwithstanding, none of these findings were adopted directly in the Policy Statement, thus, future quantitative evaluation will have to await production of the ODP and detailed building design. However, it is believed that the SEFC project could achieve significant progress in certain aspects of energy sustainability.

3) Air

Where Kwok's original proposal identified no detailed targets, design strategies and technologies for sustainability, the SEFC Policy Statement included significantly increased concerns for air quality issues. Firstly, the latter identified clearly that the SEFC project should be developed in a way to minimise the emission of air pollutants associated with the site's development and

operation and, secondly, it recommended that the City Planning Department should create a neighbourhood air quality strategy for the SEFC project in order to minimise its contributions to green house gases and indoor and outdoor air pollution.

Although no detailed plan has been specified as yet, there is a general belief that the SEFC project could considerably reduce the amount of greenhouse gases, ozone-depleting chemicals and indoor air pollutants through pedestrian oriented land use plans, public transit supply, green energy usage and education of stakeholders. In addition, comparatively high levels of mixed land use and mixed-use buildings will facilitate the reduction of private car use, traffic congestion and air pollution.

4) Water

Compared to Kwok's proposed plan, which incorporated only a few concerns for waterfront design, water sustainability issues are given greater importance in the SEFC Policy Statement which recommends that the City Planning Department develop a neighbourhood water management plan to address several key issues, i.e. reducing potable water consumption, surface runoff management, efficiency of appliances, greywater treatment and water recycling systems, decentralised liquid-waste systems,

alternative sources of funding for new infrastructure, and liability and long-term operating costs.

The Design Charrette illustrates several potential results of the policy statement for water sustainability. Two targets for rainwater (i.e. 100% rainwater recharge/purification, no more than 50% site impermeability) were proposed and examined. All three teams' designs met the objectives of 100% recharge and system visibility on site. The target is intended to be achieved via rooftop capture, swales and some form of marsh, reed bed, lagoon, etc. and the captured rainwater and greywater are intended for re-use in irrigation and toilets. The Design Charrette proposals suggest that the project could be developed as a water efficient, sustainable community model in a manner which does not significantly raise costs or diminish the quality of life. However, more quantitative comparisons will have to await the production of the ODP and detailed building design.

5) Soil

Although 'safety from contaminated soil' is the most important issue for future residents, no sufficient design guidelines have been identified, neither in Kwok's original development proposal nor in the Policy Statement. The latter refers to a few fundamental policies as follows:

The developer must prepare a remediation plan for dealing with the contaminated soils and obtain a certificate of compliance from the Ministry of the Environment, Lands and Parks. The plan should address the objectives of economic visibility and environmental health……. the City should develop a plan addressing future soil management principles for the SEFC project, which should also consider park maintenance

(CoVPD, 1999, p.68)

However, no detailed design targets and strategies have been identified for soil remediation and no legal standard has to be met before commencing development on contaminated land. In addition, the policy statement has failed to specify any systematic provision(the provision of subsidy and incentives for soil investigation and remediation) to support the developer who will have all these responsibilities. These lapses represent a very careless, dangerous approach to dealing with contaminated soil in a pro-development or pro-business climate. Kwok's planned proposal in fact illustrates the very likely effects of the policy. He indicated a minimum expense option(\$27 million) to secure economic viability and remediate soil contamination only where necessary. Far from being an ideal solution, it is a badly compromised one for dealing with contaminated soil problems and one possibly resulting in health problems arising

from residents' exposure to toxins in the long-term. The SEFC Design Charrette also explored alternative options for dealing with contaminated soils. But again most of the ideas centred on a pro-business approach rather than securing residents' safety and soil sustainability. Without setting detailed strategies, guidelines and support mechanisms it is very unlikely that the SEFC project will make significant progress towards soil sustainability. More detailed evaluation will have to wait as it is unclear which options will be adopted in the ODP plan, however, soil contamination probably represents one of the greatest threats to the success of the project.

6) Flora and Fauna

The SEFC Policy Statement has incorporated more strengthened policies and design strategies for securing flora and fauna sustainability in the site than Kwok's original plan. For instance, various strategies for site biodiversity of local flora and fauna, vegetative cover, biological productivity and restoration of the aquatic environment have been adopted. Furthermore, strengthened concerns for urban agriculture and gardening opportunities on private land, rooftops, and in public parks have been incorporated in the Policy Statement.

The SEFC Design Charrette pointed to

the potential effects of the Policy Statement to increase the quantity and quality of flora and fauna. The three professional teams pursued four design targets, i.e. 60% of green space should have habitat value; 2.75 acres of sustaining space per 1,000 population; 12.5% of produce should be grown on site; planting on 25% of roof area. All three teams declared they had achieved the targets applying various solutions. Roof gardens, courtyards, and with urban food security concerns in mind, areas for urban agriculture were incorporated in order to achieve the set targets. Team 3 sought to achieve ecological variety by designing water-fronting open space, shoreline habitat and ponds. Team 1 provided various habitats for insects and songbirds with indigenous plant species. They also recommended the extensive planting of fruit and nut trees as street trees and in public spaces, and the use of fruit bearing plants as ground cover and hedges to make the entire community an 'edible landscape'. More quantitative comparison and evaluation will have to await further planning and design progress. However, considering the strengthened concerns for sustainability of flora and fauna in the policy statement and the positive findings of the SEFC Design Charrette, it could be argued that higher levels of progress towards sustainability in flora and fauna

aspects could be achieved within the site, compared to those possible in Kwok's development proposal.

7) Built Form

Compared to Kwok's original proposal, strengthened concerns for creating environmentally sustainable neighbourhood built forms were incorporated in the SEFC Policy Statement. Most importantly, the Policy Statement recommended that the City develop a new "green building" strategy to use energy and water efficiently, to produce little waste or pollution, and to provide healthy places to work and live in. It is argued the SEFC project could achieve significant progress in these via south-oriented building layouts, passive solar system design, etc. as indicated in the SEFC Design Charrette. Secondly, strengthened concerns were expressed in the creation of roof gardens as part of the site's ecosystem to offer green spaces for recreation, urban agriculture, habitat for native species and to reduce runoff. Thirdly, the policy statement allocates a significantly larger amount of park space in the SEFC project area than the city's standard requirement (2.75 acres/1,000 residents). Finally, stronger concerns were indicated by increasing the variety of house types (i.e. cluster housing, row housing, town homes, mid-rise and high-rise

apartments) and mixed use building(live-work or work-live housing).

In addition, as in Kwok's original proposal and many other major developments in Vancouver, a height zone map was incorporated into the Policy Statement to secure the city's skyline and to minimise shadowing on public open spaces and on the waterfront pedestrian-bicycle system. The city's standard(minimum width 35ft and 25ft setback) for public walkway-bikeway was adopted near the water's edge in the project to enhance safety, accessibility and connections. Moreover, four different neighbourhood zones were created in order to provide differences in character while seeking to unify the site as a neighbourhood. The SEFC Policy Statement also recommended that the City should conduct a view analysis in order to preserve important views of the city skyline, the mountains and key landmarks (i.e. the science centre) from inside the SEFC project area to the outside, and building layout from many points inside the development. In addition, significant attention was given to various urban design issues, e.g. historical building preservation and distinct tower top design.

However, a few negative effects of the development(i.e. over shadowing of public open spaces and residential buildings and crowdedness) are unlikely to be solved by

the Policy Statement. For example, there will be similar levels of overshadowing problems in public open spaces as in Kwok's original proposal, because most of the high-rise buildings(45.2m~76.2m) are going to be located along the south edges of the site, close to 1st Avenue.

8) Solid Waste/Waste Recycling

Significantly more increased concerns for waste reduction and recycling were incorporated in the SEFC Policy Statement compare to Kwok's original plan. Most importantly, the Policy Statement recommends that the City develop an integrated waste management plan to minimise the amount of solid waste produced or hauled off-site during the entire life cycle of the neighbourhood. Various initiatives, such as salvaging and recycling of construction and demolition waste, and centralised and decentralised composting systems for household, landscape and commercial organic waste are listed for consideration. In addition, several education and incentive programmes, the 'user pays' strategies, and multi-material recycling programmes are to be incorporated in the integrated waste management plan. Onsite recycling centres(including a toxic transfer centre) are also to be distributed throughout the site. Although none of these solutions have been directly adopted in the Policy

Statement, they nevertheless suggest that the SEFC project could achieve significant progress in waste reduction and recycling. The Design Charrette indicates some positive effects of the Policy Statement, for example, various ways of dealing with household and green waste (source separation, wet garbage collection and digester installation) and reuse of composted materials to nourish existing soils.

9) People and Community

Compared to Kwok's original proposal, there are significantly increased concerns in the SEFC Policy Statement to provide a sustainable level of community support facilities, promote education programmes and the participation of public and residents in the planning and design process, and provide housing for low-income groups, the elderly and families with children. First, a strong recommendation to provide community support facilities (for families with children, youths, senior citizens, various income groups) was apparent in the Policy Statement:

A service plan or 'white paper' for the SEFC project should be developed by the city to determine an appropriate range of community facilities needed in the SEFC site to address the educational, social, health, recreational and cultural needs of residents and employees, inclusive of all age groups and those with special needs.

(CoVPD, 1999, p.22)

Community amenities identified by the policy statement are on-site child-care facilities, official maintenance office, demonstration garden facilities, public art, a community centre and school. Daily shopping within walking distance and many employment opportunities (e.g. industry, retail, office, high tech, etc.) are also clearly highlighted within the Policy Statement.

Second, to enhance the education and participation of residents and the public the establishment of "a stewardship group" is suggested to advise city staff throughout the development process and beyond. It should consist of various groups of people (property owners and businesses, residents and sustainable development experts) and have considerable power to set sustainability indicators, evaluate project performance and suggest alternative measures to achieve sustainability targets. Moreover, it is intended this becomes a 'Neighbourhood Integrated Service Team' (a corporate team integrating neighbourhood service delivery) to help manage the area after completion of the development. It is one of the most remarkable innovations in the SEFC Policy Statement.

Finally, for promoting social mix within the neighbourhood, the Policy Statement adopts higher levels of family housing (35% of total housing units) compared to the

city's standard(25%). It also promises a similar level of non-market housing(20% of total housing units, of which two-thirds will be suitable for families with children, and the remaining one-third for low-and moderate income single and senior persons and those with special needs). However, it is important to note that in actual fact the Kwok's plan will deliver 750 social housing units whereas the Policy Statement proposal will provide just 400. In addition, there is great uncertainty as to the latter target's fulfillment because it is still unclear whether the City can obtain sufficient subsidies for this from the federal government or elsewhere. Further detailed evaluation is necessary.

3. Key Constraints and Lessons

1) Competing Issues and the Role of Planners as 'Champions'

A number of conflicting views over the best use of the proposed site arose during the planning stages of the development, and consequent conflicts between key actors and citizen groups were commonly cited as barriers by the planners. In particular, starkly different choices were proposed by a number of other organisations. Farm Folk/City Folk, for instance envisioned residents raising small farm animals and growing

vegetables. Further, a leader of the Urban Youth Alliance and a housing advocate, who now sits on the City's advisory group for the project, stated, "We should be talking about social justice, not sustainability..... the site should be used for low-income housing". Moreover, Vancouver's Park Board, supported by a recently formed residents' group, is urging Vancouver Council to turn the site into parkland and not the residential community proposed by City officials. For example, a senior planner of the Park Board's Steering Committee on the project refutes the idea that a high-density residential development is viable, arguing that:

The three adjacent communities are so badly deprived of parks that they still lack adequate green space..... it would be more economic to turn the city-owned portion of the land into a park than it would be to create housing on it..... the soil remediation costs are likely to be so high that it would prove uneconomic to turn it into a residential neighbourhood. A "cap and dam" method would be much cheaper with a new layer of soil on which the park would be constructed..... they don't know the degree to which it has been contaminated.

(interview: planner)

None of these suggestions are compatible with the visions of most community groups who are suggesting building heights in the four-to seven storey range, with about 3,500 residents in total, similar to the South False

Creek development in the 1970s.

All groups have presented solid arguments for their proposals, however, City Hall's vision for the site is a model energy-efficient, walkable, dense, mixed neighbourhood, in which people live and work near the downtown area and local jobs, while maintaining and balancing the highest possible levels of social equity and livability, ecological function and economic prosperity. One reason why a high-density development is favoured is to cover the costs of cleaning up the contaminated soil in the former industrial area. A senior planning department officer interviewed commented:

The city estimates soil remediation will cost \$30 million..... with that figure, a fairly high-density neighbourhood is a viable option..... the densities would be similar to those in the Concord Pacific development..... In addition to the park, the SEFC project offers an opportunity to do something special. The Council has taken a leadership role..... to make the project a unique, cutting edge model of a sustainable urban neighbourhood..... by developing a high-density, sustainable urban neighbourhood in the project, we gain public access to the waterfront, while greatly improving the environmental health of both the site and the city as a whole, at no cost to other Vancouver taxpayers.

(interview: planning officer)

One of the key strengths of the planning process is that the high number of different opinions over the best use of the site arose

out of the significant level of public consultation. In order to collect various suggestions and decide on the best model of sustainable urban neighbourhood development in the project, the planning department organised various public participation activities and commissioned in-depth professional research. For example, to encourage public involvement, the City and Planning Department organised various public meetings to reflect public interests in the original idea. The consultation process for the SEFC Policy Statement involved more than 30 meetings with hundreds of individuals and interest groups. There were three special council meetings which heard from 45 speakers: 34 in favour, 10 against, and one proposing a 160-foot tower and observation deck surrounded parks (Mungrew, 1999). In addition, to aid professional involvement, the city conducted various consultation sessions. Further the consultation report, entitled "Vision, Tools and Targets: Environmentally Sustainable Development Guidelines for the SEFC Project" provided valuable findings for future sustainable development. The report envisioned specific environmental goals and objectives, focusing on 8 key issues: solid waste, transportation, energy, air emissions, soil, water, green spaces, and buildings. Moreover, the SEFC Design Charrette has also been an effective tool for investigating

the in-depth opinions of professionals and the application possibilities of various innovative ideas. In addition, it is important to note that the planning teams both worked and fought against misconceptions in the media at the same time. By writing letters to news editors they made public the known barriers and also revised erroneous statements in news articles. During the above mentioned in-depth planning and design process conflicts over the best use of the site were resolved and a final decision: SEFC Policy Statement to guide the creation of official development plan was adopted by the City Council.

This model of public and professional consultation represents a valuable precedent for future planners. All the experiences of the Planning Department illustrate how future planners should act in order to manage competing issues and search for an appropriate solution, working actively throughout the planning and design process not only as governors, but also as public activists toward sustainable development.

2) Contaminated Soil Remediation Costs

Contaminated soil remediation cost was one of the most significant barriers facing the model sustainable development process in the SEFC project, the most contentious point being the actual cost of cleaning the

contaminated soil in the old industrial area and agreeing how the cleaning process should be funded.

The anticipated cost for clean up of the land before building a mostly residential development was \$ 47 million, based on the accepted cleaning routine used on the north shore of False Creek. This involved piling the dirt into a dump truck and hauling it to Swan Hills, Alberta, or a dump site in Washington State at a cost of \$ 2,000 per truck(O'Brien, 1998). Kwok estimated that removing all the contaminated material would cost at least \$ 125 million. If some soils were capped rather than removed, it would cost \$ 27 million. Therefore, depending on the scale of development, the property could either be worth less than \$ 20 million or there could be a \$ 78 million liability.

Thus, the City needs to decide the best way to pay for the cost of soil remediation. In the initial stages, there was great debate as to how the initial cost could be set. On the one hand, some argued that the city should pay and recover payment from the development or other financial sources. For example, the director of Central Area Planning argued, "we(the City) own most of the land, so the soil cost must be borne by the City... it would be paid for by our property endowment fund, which is the

development arm of the City". Cowie(1998) maintained that "the City had to go to a high-rise development scenario to cover the cost of soil remediation". The City and planning team subsequently adopted a high-rise, high-density development scenario as a solution for extremely high soil remediation costs. This scenario was specified in Kwok's original proposal.

However, critics such as Beers(1998) and Teaker(1999) argued that the City should find the original owners and make them pay. Community groups insisted that the City should reduce development density in the project because the scenario of a mid-rise urban village on the lines of False Creek South, with significant levels of accommodation for families and renters, was a better model than the high-density, high-rise development being adopted, although the low-rise, low-density model would impose severe limitations on the ability to pay the initial costs. Councillor Herbert (1999) pointed out that it would be difficult to place the responsibility on the industrial polluters since the owners sold the land to the City in the 1940s and probably could not now be held accountable.

Although the City adopted an alternative plan to expand the park and recreation land to 26.4 acres(106,836 m²), or over half of the City-owned land north of First Avenue (Tromp, 2000) in order to placate protestors

and reduce soil remediation costs, it is interesting to note that the model envisioned by the Policy Statement differed very little in terms of density and building height from Kwok's original plan which was so heavily criticised by environmentalists and citizen groups.

City planners may argue that it is essential to recoup the initial investment in order to achieve economic sustainability. However, it seems this is due to the City's development agenda for the project originating from and remaining in line with Kwok's original proposal in which the high-rise, high-density development envisioned economic viability without subsidy. Thus, there are no significant changes to the in-depth full cost analysis of potential savings related to sustainable development. Moreover, there has been a lack of willingness and effort on the part of the City to find alternative financial sources and to pursue long-term interests rather than short-term pay back. Inevitably, this could have various negative effects, such as difficulties in funding non-market housing and overshadowing problems in public open spaces due to the high-rise apartment buildings on the south.

3) Information Sharing and Collaborative Working and Their Effects

The project shows effective methods for information sharing and collaborative working

between professionals and citizen groups, and illustrates their positive impact on sustainable urban neighbourhood development. The City established and operated a well documented Internet site and e-mail network for the project (<http://www.city.bc.ca/commsvcs/planning/sefc.htm>) which provided easy access to key consultation reports and key professionals. As a result, citizens and professionals were able to participate in the planning process without significant difficulties. Various E-mail networks were also constructed for information sharing and communication between the City and citizen groups (Taschereau and Wornell, 1997).

In addition, the City (with the co-sponsorship and direct participation of the National Canada Mortgage and Housing Corporation) hosted an intensive three day Design Charrette which sought to inform the planning process by testing the design guidelines against the development programme, determining where the guidelines were overly restrictive or insufficiently specific, and assessing how the integration of sustainable principles and guidelines into the planning process would affect the building programme (Polland, 1999).

The experience of information sharing and collaborative working among planners, developers, architects, citizen groups, and academic researchers provided significant

lessons for future sustainable development. In particular, the Design Charrette highlighted the critical fact that a multidisciplinary and holistic design process is essential for achieving a sustainable paradigm. Polland (1999) argued that without the equally weighted, simultaneous input from engineers, landscape architects, students, CMHC researchers, development consultants, planners, regulators and architects into the design process at the outset, the interrelationships and interconnections between natural, economic and built form aspects of a community could not be fully and properly explored and exploited. Thus, it can be argued that 'information sharing' promoted participation, communication and cooperative working among the key players (i.e. planners, architects, developers, citizen groups, academic researchers, etc.), and consequently supported sustainable urban neighbourhood development. It could also be said that without expert-led public and professional consultation and interest group lobbying it would be very difficult to make progress towards sustainable development.

4) Insufficient Resources, Bureaucracy and Their Effects

Bureaucracy and insufficient resources were commonly cited as barriers by key actors. One planning officer interviewed, for

instance, stated:

Most municipalities have been facing budget cutbacks for about 15 years……. municipal officials are suffering from under-resourced workloads……. the result is a bureaucracy which is very demoralised and exhausted and overworked……. causing us all to get sick regularly……. I feel quite caged working as a bureaucrat.
(interview: planning officer)

He further commented that some key planners had left the planning team for new jobs and other bureaucrats were waiting to retire. In fact, bureaucracy created considerable problems such as delays in schedules and lack of consistency in policy. Moreover, bureaucratic attitudes represented one main factor why the City could not complete a 'perfect' set of policy statements and provide many simple recommendations for a renowned project, especially in energy use, water management, waste, soils, air, etc. Although it is the intention to produce detailed design policies for guiding the ODP process, there is considerable doubt over their successful application since planners are going to suffer from the same problems(lack of time and resources) while having to conduct at the same time the two complex jobs of developing the Official Development Plan and setting detailed design guidelines, which should be completed one after the other.

A set of regulations is one of the most

important factors in achieving sustainability, especially in the current pro-business-only climate. But, as illustrated above, when planners have insufficient resources to do their job problems result, bringing chaos to the planning and design process, and furthering environmental damage and pollution. Thus it can be argued that providing sufficient resources(time, money, human resources) and setting institutional promotion programmes(staff education, rewarding good performance, hiring private professionals) should be encouraged to support innovative planning and design work and minimise the negative effects of bureaucratic attitudes.

5) Public Participation and Its Effects

Despite some problems, such as excessive time consumption and conflicts amongst profit groups, public participation in the lay public and citizen groups represented a positive contribution to the goals of achieving sustainability in the project. Group members fought against the appointment of Stanley Kwok as Development Consultant when the Real Estate Division initially selected him without open competition. In addition, they conducted powerful lobbying and public education programmes against Kwok's proposal because they argued that it did not include social and environmental objectives.

Their objections led to the involvement of the wider public, drawing a wide range of participants into the SEFC planning process, and the presentation of alternative options for the site. The public and community groups' protests made the City move more assuredly towards sustainable development by conducting several valuable pieces of research. In particular, the Sheltair Group's research(originating from the protests) brought significant progress towards sustainability by providing a clear definition of sustainability, design targets, indicators, performance standards, a data bank of relevant precedents and a framework for full-cost accounting. The successful experience of public participation in the project originated from the City's long history and good support mechanisms(i.e. information sharing) for public participation through the downtown mega-projects. In addition, it facilitated many non-profit community groups' (e.g. EYA, SEFC Working Group, etc.) active participation in the planning process. Thus, it can be argued that including non-profit community groups and supporting their active participation should be encouraged in future projects.

6) Design Targets, Indicators and Full-cost Accounting Framework: Were They Useful?

Most Canadian planners and academic

professionals interviewed maintained that the SEFC's performance targets and indicators were one of the best achievements in the planning process and should be adopted as a main policy. The present research supports this conclusion. One planning officer interviewed, for instance, commented:

When I need to consult various groups of people who have different backgrounds and interests I always use the performance targets and indicators because they provide detailed criteria or background data for discussion..... even elderly people and the lay public can understand my explanations when I use them..... to evaluate a model and its potential effects.

(interview: planning officer)

The City also indicated that the performance targets could be useful in development planning discussions. In addition, the Policy Statement recommended that the City and the Stewardship Advisory Group should develop indicators to monitor the neighbourhood's performance after the completion of the development. But, surprisingly, the City did not adopt the SEFC design targets and indicators and it is difficult to understand why it rejected them since they were set by a well-organised consultant. The City argued that the levels of performance were too aggressive to adopt: however, this is not a convincing argument because the word 'target' indicates only a future goal. If

only achievable targets can be adopted, targets have already lost their function of encouraging key actors (developers, planners and architects) to make significant progress towards sustainability. It is clear that the main reasons for the City's refusal were a lack of understanding of the targets' importance by the City's pro-business politicians, significant lobbying by developers, and bureaucratic planners' lack of power to influence the City's ultimate decision.

Moreover, although it had invested a significant amount of money and established a full-cost accounting framework, the City did not attempt to use the framework because it would have been forced to reduce development density and building height, and increase green space provision. Further, only a few people in the City understood its complex calculation methods. In fact, it is very difficult (if not impossible) to identify any attempt by the City to use the complicated accounting method which may have minimised economic returns from the development. Thus, it can be argued that the design targets, indicators and full cost accounting framework were effective tools for consulting the public and developers, but the City failed to adopt them as a legal document or framework for guiding the development process due to a lack of political willingness and pressure from developers, protest groups, lobbying and

entrenched bureaucratic attitudes.

4. Overall Evaluation of the Project

An overall evaluation of a cross-comparative analysis of the ultimate plan in the SEFC Policy Statement and Kwok's original proposal along the nine themes (land use and transportation, energy, air, water, soil, flora and fauna, built form, solid waste/waste recycling, people and community) and 29 indicators is presented in <Table 2>. It is believed that the SEFC project could achieve a higher level of progress in most of the indicators than Kwok's original proposal (an example of a well-designed, compact, transit-oriented high-rise, high-density development in Vancouver) due to the SEFC Policy Statement which effectively describes and deals with the complicated concept of "sustainability" and provides additional guidance for realising the vision of a sustainable community. Most sustainability issues (a total of 6 key issues and 23 detailed sub-issues) which span the entire development process and reach into the post-development stage have been identified and covered in the Statement. New ideas (e.g. a section entitled 'stewardship' which recommends the establishment of a Stewardship Advisory Group, comprising community and interest group representatives and City staff) have been added. Moreover, other environmental

<Table 2> Evaluation Table

Key themes	Goals	Objectives	Indicators	Formula for calculating the level of indicator implementation	Level of progress towards sustainability			Evaluation of the ultimate plan in the SEFC Policy Statement with Kwok's original proposal
Land Use and Transportation	1. Optimise residential densification	1. Higher density to reduce urban land take	1. Housing unit per hectare	(total number of housing units/ hectare)	➔ (110-164 unit/ha)			Lower housing density (2000-2500 units compared with 3,750 units in Kwok's proposal)
	2. Increase choice of facilities, jobs and housing within easy walking distance	2. Increase proximity of housing to key activity centres	2. Job/housing ratio within the neighbourhood	(number of jobs available within the neighbourhood/number of housing units)		➔ (less than 0.5)		Increased concern for mixed land use and mixed-use buildings within city-owned and private land
			3. Percentage of dwelling units within 400m of basic personal services (e.g. food shops, post office, bank, school, etc)	(number of dwelling units within 400m of basic personal services (e.g. food shops, post office, bank, school, etc) / total number of dwelling units) x 100	➔ (100%) ³			No significant difference between Kwok's original proposal and the SEFC Policy Statement, but 100% of housing units have good accessibility (400m walking distance) to basic services
	3. Increase choice of transport mode for trips outside the neighbourhood	3. Increase pedestrian, bicycle and transit amenities within the neighbourhood	4. Percentage of street area that is dedicated to non-car use within neighbourhood	(amount of area dedicated for working and cycling (total amount of street area) x 100		➔ (60-70%) ³		Increased park space and strengthened concerns for walk-bike roads
Energy		4. Increase accessibility and safety of public transportation	5. Number of public transport routes to local centre within 10 minute journey	(number of available public transport routes to local centre within 10 minute journey)	➔ (3) ³			Several choices available (streetcar, bus, ferry), but similar to Kwok's proposal
	4. Maximise sustainable and efficient use of energy resources	5. Reduce non-renewable energy consumption	6. Percentage of reduction of energy consumption for typical dwelling within the neighbourhood	(amount of energy consumption reduction per hour per unit) / (amount of energy consumption per hour per unit) x 100		➔ (25%) ¹		Strengthened concern and targets for reducing energy consumption
	5. Minimise need to expand energy infrastructure	6. Increase the diversity of energy resources used within the neighbourhood	7. Percentage of buildings connected to a CHP/district energy system	(number of buildings connected to district energy systems or CHP / total number of buildings) x 100			➔ (90%) ¹	Strengthened concern and targets for district heating system
		7. Increase neighbourhood generation of renewable energy	8. Renewable energy generated within the neighbourhood	(amount of renewable energy generated within the neighbourhood per person per hour)		➔ (5%) ¹		Strengthened concern and targets for increasing renewable energy use and on-site renewable energy generation
Air	6. Minimise harmful emissions in the air	8. Reduce green house gas emissions	9. Percentage of reduction in CO ₂ emission from energy used for transportation ³	(amount of CO ₂ emission reduced from heating and cooling for typical dwelling per m ² per hour) / (average CO ₂ emission from heating and cooling per m ² per hour) x 100		➔ (40-50%) ³		A strong policy statement for reducing CO ₂ emission via quality assurance, low energy housing design, CHP, etc.
		9. Increase quantity and quality of tree cover to purify harmful emissions in the air	10. Percentage of tree cover	(total size of land planted by trees/total size of land) x 100		➔ (30-40%) ³		Increased concerns and targets for park lands
		10. Reduce chemical and biological contaminant emissions indoors	11. Percentage of buildings designed and built with basic features that minimise indoor pollutant levels	(number of buildings designed and built with basic features that minimise indoor pollutant levels/ total number of buildings) x 100		➔ (25%) ³		Increased concerns and targets for indoor air quality
Water	7. Maximise the efficient use of fresh water	11. Minimise water consumption	12. Percentage of reduction of water consumption	(total amount of water consumption reduction per person/day) / (Average water consumption per person/day) x 100			➔ (50%) ¹	Strengthened concerns over water recycling, monitoring, etc. and target for reducing water consumption
		12. Increase levels of rainwater penetration for ground water sustainability	13. Average imperviousness of the total site area ³	(size of lands according to their cover type x imperviousness ratio)/total size of land			➔ (54%) ¹	Increased green space (i.e. 50% parks as opposed to 25% in Kwok's proposal) and strong target for water imperviousness
	8. Minimise water pollution	13. Increase local sewage treatment within the neighbourhood	14. Percentage of sewage treated within the neighbourhood	(amount of sewage treated per person/day) / (amount of sewage produced within neighbourhood per person/day) x 100		➔ (25%) ¹		Strengthened concern and target for biological water treatment and grey water recycling

Key themes	Goals	Objectives	Indicators	Formula for calculating the level of indicator implementation	Level of progress towards sustainability				Evaluation of the ultimate plan in the SEFC Policy Statement with Kwok's original proposal
Soil	9. Minimise the productivity and safety of soil	14. Increase soil productivity	15. Amount of produce grown within the neighbourhood	(amount of produce grown within the neighbourhood/ amount of produce consumed per person/ year) x 100	→	(12.5%) ¹			A clear policy statement and strong concerns for city farming (no mention of the latter in Kwok's original proposal)
		15. Increase soil safety and decontamination	16. Percentage of land that preserves good quality top-soil	(amount of land that preserves good quality top-soil/ total amount of land) x 100	→	(0%) ³			No concerns for this as it is a brownfield redevelopment
			17. Percentage of contaminated land reclaimed within the neighbourhood	(amount of contaminated land reclaimed/ total amount of contaminated land) x 100	→	(60-70%) ³			No significant difference between Kwok's original proposal and the SEFC Policy Statement
Flora and Fauna	10. Maximise local habitat diversity	16. Increase the quality and quantity of habitat provided for a range of appropriate species	18. Percentage of land with significant habitat value	(amount of land with significant habitat value/ total amount of land) x 100				→	Strengthened concern and target for biodiversity of the site
		17. Increase vegetative cover on the site	19. Percentage of total neighbourhood roof area designed to carry plant life	(amount of roof area designed to carry plant life/ total roof area) x 100			→	(25%) ¹	Increased concern and target for rooftop gardens
			20. Percentage of vegetative land lost/increased by the development	(Percentage of total vegetative land after development-Percentage of total vegetative land before the development)				→	Brownfield redevelopment A 100% increase in park spaces in the SEFC Policy Statement
Built Form	11. Increase quality of built form	18. Increase aesthetic quality, sense of place and flexibility of housing	21. Number of housing types by habitable room	(Number of housing types (e.g. 1 bed flat, 2 bed flat, 2 bed house, 3 bed house, etc.)	→				Mix of different housing forms (i.e. low-rise, mid-rise, towers) but, similar to Kwok's proposal
		12. Increase energy efficiency of buildings	19. Provide an energy-efficient built form and layout	(dwelling units with good solar orientation/ total dwelling units) x 100			→	(7%) ¹	Similar (or slightly higher) to Kwok's proposal
		13. Increase sense of safety within the neighbourhood	20. Increase safety by design and CCTV	(number of buildings that adopt anti-crime design strategies (e.g. eyes on street, security elevator, CCTV, etc.)/ total number of buildings) x 100	→	(80-90%) ³			No significant difference between Kwok's original proposal and the SEFC Policy Statement
Solid Waste/ Waste Recycling	14. Minimise waste generation and maximise the diversion of all waste disposal	21. Reduce the generation of neighbourhood waste	24. Percentage of reduction of waste produced	(amount of waste produced per dwelling unit per day) (average amount of waste produced per dwelling unit per day) x 100				→	Increased concern for organic waste reduction, education, separate waste collection, waste monitoring, etc.
		22. Increase the use of recycled/salvaged construction materials	25. Percentage of construction materials recycled	(amount of construction materials recycled/ total amount of construction materials used) x 100				→	(30%) ¹
		23. Maximise on-site organic waste treatment	26. Percentage of organic waste processed within the neighbourhood	(amount of organic waste processed within the neighbourhood per person per day)/ (total organic waste produced within the neighbourhood per person per day) x 100				→	(50%) ¹
People and Community	15. Promote socially mixed community design	24. Increase mix of housing type and tenure	27. Percentage of affordable housing for low income groups	(number of housing units for low income groups/ total number of housing units) x 100	→	(20%) ³			City's standard level, no different to Kwok's proposal
		25. Increase public participation in planning and management of site	28. Number of local environmental agencies and citizen groups participating in the planning process	(number of local environmental agencies and citizen groups participating)				→	(Very high) ³
			29. Percentage of residents participating in the planning and management of site	(number of residents participating/ total number of residents) x 100				→	(Very high) ³

1) Targets set by the initiatives. 2) Estimated values by the key actors. 3) Calculated figures by the author. 4) Using data from the BRECSU report on the Standard Assessment Procedure for energy rating of dwelling. 1994 (Case 52, LPG: 76, Heating oil: 75, Anthracite: 90, Smokeless solid fuel: 116, electricity: 188) (unit: kilograms of carbon dioxide per GigaJoule). 5) Using imperativeness ratings set by the Shitar groups (roof: 55%, road: 75-95%, grass: 40-60% and permeable paving: 60-80%)

issues such as energy use, water management, waste, soils, air quality, urban agriculture have redefined a previous policy statement and addressed the ecological, social and economic aspects of a sustainable community. This is another important innovation established towards sustainable neighbourhood design. Further, it identifies the type and amount of development that will be considered through the later phases of planning and design, and lists standards for necessary public amenities in the development, such as waterfront walkways, parks, public open spaces, community facilities, daycare and city-wide provisions. Overall, the SEFC Policy Statement envisions a well designed, mixed community with a large green park assembled within a beautiful surrounding environment and offering good accessibility to the city centre.

However, there are several significant weaknesses. First, and most importantly, the SEFC Policy Statement has failed to adopt the performance targets recommended by the sustainable development team as legal policy. Second, the proposed density is still high, although the target: 2.2 million square feet is slightly lower than in Kwok's original proposal. Third, there is uncertainty as to how remediation of the existing soil pollution on site will be financed. Finally,

there has been a failure to reduce parking provision within the site, despite its proximity to the city centre and residents' accessibility to public transport.

In summary, despite some weaknesses identified above it would appear that the SEFC project is heading toward sustainable neighbourhood design in terms of policy, public education, citizens' and experts' participation, and environmental planning and design, partly as a result of the Policy Statement envisioning significant sustainability progress.

V. Conclusion

The SEFC project provides several important lessons towards sustainable urban neighbourhood design. Firstly, the planner-led planning and design process has illustrated how future planners should act in order to manage competing issues and search for an appropriate solution, working actively not only as governors, but also as public activists towards sustainable neighbourhood design. In order to find the best model, the planning department organised various public participation activities and commissioned professional consultants to collect various suggestions. This planning and design process is one of the key strengths of the SEFC project and the most valuable precedent for

future planners. Secondly, the project experiences illustrate that setting achievable targets, indicators and a full cost accounting framework is an effective tool for encouraging key actors to achieve significant sustainability progress and for consulting the public and developers. Furthermore, the experience shows that the targets should be adopted as a legal document or framework for guiding the development towards sustainable neighbourhood design. Moreover, it has demonstrated clearly that strong political willingness is necessary to do this. Thirdly, the experience suggests that information sharing and collaborative working among planners, developers architects, citizen groups and other academic researchers should be given high priority in order to make significant progress towards sustainability. In particular, it shows the positive effects of information sharing via an Internet web site, e-mail network and Design Charrette for participation, communication and collaborative working among key actors. Fourthly, it demonstrates that public participation, especially that of non-profit community groups, contributes various positive effects toward sustainable neighbourhood design, despite some negative problems(excessive time consumption and conflicts amongst profit groups). Fifthly, providing sufficient resources and setting an institutional promotion programme should be

encouraged to support innovation and to minimise the negative effects of bureaucratic attitudes. Finally, although the project shows various constraints in brownfield redevelopment(i.e. the high expenses for soil remediation, the identification of polluters, soil safety standards) it also indicates possible ways(e.g. clustered development, subsidy/incentives, minimum soil excavation, density control, new technologies, etc.) to overcome them.

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원 고 접 수 일 : 2004년 2월 20일
최종원고채택일 : 2004년 3월 12일