

**VALUING GREEN SPACE
IN
THE URBAN ENVIRONMENT**

- Applying and Evaluating the SVR Approach -

By

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ABSTRACT

This thesis serves the following purposes: (1) to understand the importance of green space values, (2) to understand the importance of the use of values in the decision-making process, and (3) to employ and evaluate a technique called the structured value referendum to elicit values (including green space values) that are important in making a land use decision.

Green space is any area that is predominantly undeveloped within the urban environment. Although the importance of green space has been widely recognized since the 1960s, there still exists a limited appreciation for green space functions. The lack of comprehensive values incorporation that includes green space values in land use decision-making processes is a primary cause of green space loss.

In order to understand the importance of green space loss and the lack of values incorporation in decision-making, a general concept of value is established. Development of a taxonomy exposes green space's economic, social, ecological, and sustainability values, and helps to underscore their importance in decisional settings. A general discussion on values elicitation reveals that their incorporation into decision-making processes can help set priorities, promote a better understanding of the issue, and lead to the development of more effective decisions. Despite these assets, inclusion of a comprehensive set of values rarely occurs in decision-making processes involving green space, and green space values are often ignored.

There are, however, value elicitation techniques that can be used to account for green space values. One technique that has yet to be examined extensively for its effectiveness in aiding land use decision-making processes is the structured value referendum (SVR). The SVR is a voting-based structure that can elicit a full range of values. A literature review and case study evaluate the SVR. In the case study, a referendum based on a land use decision involving 100 acres in Richmond was designed and distributed to a random sample of 200 voters. The results of the case study could aid Richmond public officials in making a decision for the best use of the land. This case study also reveals that the SVR approach is an effective and feasible means for eliciting values and aiding decision makers in making comprehensive land use decisions that involve green space.

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CHAPTER 1 - VALUING GREEN SPACE - NATURE AND PURPOSE OF THE STUDY

1.1 Introduction

The loss of green space is an issue faced by urban areas worldwide. As populations expand, green space within the urban environment is consumed by development. British Columbia's lower mainland is no exception. With increasing development, many valued green space areas are being lost or threatened. Examples of these areas include Cypress Bowl on the North Shore, the Grandview Cut in East Vancouver, Burns Bog and the Spetifore lands in Delta, and Terra Nova in Richmond.

Primarily since the 1960s, green space values have been documented; various ecological, economic and social values associated with green space have been expressed by advocates. Over the past three decades, research on green space has refined these values and has allowed preservationists to be more articulate; and with increased development pressures, the need to effectively express green space values is becoming even greater.

In contrast to these values, development advocates primarily express the economic value of development and the need to meet the growing population's demands. These disparate values ultimately lead to conflict; and when the final land use decision is made, all values are rarely incorporated into the decision-making process. All values, however, are important and should be used to develop as comprehensive a land use decision as possible. By decisively eliciting and understanding the nature of these values and by linking them with public participation processes and structured frameworks that incorporate scientific facts and uncertainty, decision makers can develop more widely supported land use allocation decisions (Roessler, 1993).

This thesis is intended to advance an understanding of the role of green space, the importance of values incorporation in decision-making processes, and people's awareness of the role of green space and their values for green space.

Following in this chapter is the problem area and rationale, purpose and objectives, methods, definition of green space and organization of the thesis.

1.2 Problem Area & Rationale

Two related problems are examined in this thesis; they are the loss of urban green space and the lack of public values incorporation into the decision-making process on this issue.

British Columbia's lower mainland, like many other parts of the world, is experiencing significant population growth. With increasing population comes increasing development and the subsequent loss of natural areas. Although the Greater Vancouver region has 8.4 hectares per 1000 habitants (in part due to the designation of numerous regional parks) (Adams and Meredith, 1993), which is well above the arbitrary minimum standard of 4 hectares per 1000 habitants (Gold, 1985), the supply of open space in and around our metropolitan areas is dwindling. What little has been preserved by the foresight of previous generations is inadequate to meet the needs of the future (Vancouver Sun, 1991). The loss of green space is considered by many people in the lower mainland to be an important environmental issue. Green space offers ecological, economic and social values, which can all be related to the larger issue of sustainability.

As more information is gathered about the different pressures being placed on the earth's life support systems, the issue of sustainability becomes increasingly important to people around the world. Many advocates of sustainability believe that if we are to achieve sustainability, which essentially involves satisfying our current generation's needs without sacrificing the needs of future generations (Jacobs, 1991), control of population and material growth is necessary. (Jacobs, 1991; Ophuls and Boyan, 1992).

On a local scale, one part of acting sustainably involves managing and controlling how and what we develop. More specifically, it involves deciding whether or not to preserve green spaces. Urban land use decisions involve public bodies which must often determine the most appropriate use for land that is in demand by both developers and green space preservationists. Questions that arise and must be handled by decision makers include: 'Should green space be preserved? If so, how much should be preserved, and at what cost?'

Tradeoffs are inevitable, but too often, values from all interest groups are not incorporated into making the most effective tradeoffs. Typically, valid green space values and related arguments presented by preservationists are ignored and the economic pro-development argument

wins. Preservationists' values, however, are worthy of consideration; and if the environment and its inhabitants are to remain healthy, private short term economic benefits can not continue to be the sole driving force in the decision-making process.

Recognizing the need to understand disparate values with regard to land-use planning issues is becoming more prevalent. For example, the Commission on Resources and Environment (CORE) process is being used by the provincial government as a values-incorporation tool. CORE attempts to take a 'shared decision making approach' to planning and management of land/resource use so as to include all relevant interests (CORE, 1992). To date, however, there has been limited use of decision-making methods that can structure and organize green space values so that they can be used to help make comprehensive land use decisions regarding the preservation of green space (McPherson, 1992; Burgess et al., 1988; Barker, 1986).

Given that values should be a main consideration in land use decisions, the problem facing decision makers is how to effectively elicit and weight the values attached to green space. Many green space values can be difficult to elicit, and are not readily quantifiable. They can be a limiting factor in successfully developing solutions to land use issues. Thus, green space values and their elicitation require thoughtful consideration in rational decision processes. The study of green space values and their elicitation are the primary focus of this thesis.

1.3 Purpose and Objectives

This thesis emphasizes the importance of considering and incorporating green space values in the decision-making process. There have been few methods in public decision-making that fully incorporate all public values. The purpose of this thesis is threefold: to understand the importance of green space values, to understand the importance of the use of values in the decision-making process, and to employ a technique called the structured value referendum (SVR) to elicit values (including green space values) that are important in making a land use decision. This technique will help the researcher to understand people's awareness of and characterize the importance of the role of green space in the urban environment. The SVR has the potential to systematically elicit, clarify and incorporate all public values in an effective manner which can then be used to aid decision makers in choosing the most appropriate option based on public feedback. The overall

effectiveness and usefulness of the SVR in aiding the land use decision-making process is evaluated¹.

Seven objectives serve to meet this threefold purpose. These objectives are:

1. to outline the problem context of green space loss;
2. to understand the general concept of value;
3. to develop a comprehensive list of green space values that have been previously documented;
4. to understand the rationale for clarifying and using values and acknowledge available valuation methods;
5. to discuss the SVR method and explore its application, strengths and weaknesses;
6. to employ an SVR and describe the set up and results;
7. to discuss the policy implications of the findings and discuss the effectiveness and usefulness of the SVR in aiding decision makers to incorporate values and make tradeoffs.

1.4 Methods

Three research methods are used to meet the objectives and purpose of this thesis - a literature review, a case study and consultation with City of Richmond officials.

1.4.1 Literature review

In preparation for the values-elicitation part of the study, there is a literature review of:

- the problem context of green space loss - the impacts and causes;
- the concept of value and documented green space values;
- the importance of clarifying values and the current lack of values incorporation with regard to green space preservation issues. Different valuation methods are briefly examined; the SVR method is discussed in detail;
- the history and current situation of the Terra Nova case study;
- objectives and alternatives structuring process, and
- the policy implications of the SVR and the results obtained.

This literature review will provide a foundation from which to build the SVR in the case study.

¹It should be noted that when conflict arises between green space advocates and development advocates, the use of a values elicitation method like the SVR is helpful only in situations where the land use decision involves input from public bodies. If the land under question is privately owned and appropriately zoned (e.g. for housing development), the use of the SVR approach is not appropriate. Other methods would need to be used to convey to the developer the values of green space and the importance of its preservation.

1.4.2 Case Study

The SVR approach, in a simplified form, is used in a case study to meet one of the purposes of the thesis - to employ and evaluate a technique to elicit values that are important in making a land use decision. This technique will help to expose people's awareness of and characterize the importance of the role of green space in the urban environment. In order to apply the SVR approach to a relevant situation, 100 acres of green space that is part of the Terra Nova lands in the City of Richmond is used as the case study. Presently, the city council is faced with making two decisions relating to the green space. They have the option to buy parcels of land in Terra Nova. The City currently owns 51 of the 100 acres. They must decide how much land to buy, and if they do continue to buy the land, they must decide what to do with it. Since this land purchase is for the benefit of the public, the land use decision-making process could benefit from public input. However, to date, no public input has been obtained. The SVR approach could be a useful tool in aiding the decision-making process.

By using Terra Nova as the case study, the effectiveness and feasibility of using the SVR approach to elicit values, make tradeoffs, and reach a comprehensive land use decision is explored. To develop the referendum, values from three groups of people are elicited and structured. The values structuring process helps to create alternatives, determine their impacts and prepare a referendum question. The final referendum questionnaire describing the decision context, the alternatives and their impacts is then designed and distributed to a random sample of 200 people in two shopping malls and the Minoru Cultural Centre in Richmond.

1.4.3 Consultation

Once values are elicited from the study groups, objectives are structured and alternatives are developed. Consultation with Richmond planners was necessary to obtain feedback on the objectives, and on the impacts of the alternatives and their feasibility. Once feedback was obtained, the referendum questionnaire was distributed to the random sample of 200 people.

1.5 Definition of Green Space

A definition of green space is provided to help establish the scope of the thesis. Green space is generally any area that is predominantly undeveloped and is found within an urban environment (Gill and Bonnett, 1973). It is comprised of natural or semi-natural areas, where biotic and physical processes predominate over human influence; these areas are comprised of flora and fauna that are native or were introduced in the past. Green space may be comprised of trees and shrubs that are sparse or in great abundance. It may or may not be carefully arranged and maintained. Green space encompasses urban forests, wetlands and marsh areas, bogs, shorelines, rural space and overgrown farmland. Sites can also include urban and regional parks, natural reserves, and vacant unprotected wild enclaves rich in living organisms (Adams and Meredith, 1993; Lyle, 1986). This term is intended to be broad and inclusive.

1.6 Organization of Thesis

This thesis is comprised of six chapters. Chapters 2, 3, 4 and part of 5 are developed through literature reviews. Chapter 2 provides a brief discussion on the problem context of green space loss. Chapter 3 looks at the concept of value and provides a rationale for green space retention by examining different values associated with green space. This chapter also provides a rationale for values incorporation into decision making, discusses the problem of the present lack of values incorporation with regard to green space and land use decisions, and briefly examines current valuation techniques. Chapter 4 then discusses the structured value referendum and evaluates its ability to elicit values and place them in a decision framework. The case study is undertaken in chapter 5. The feedback obtained from the SVR case study, as well as the information from the literature review are used in chapter 6 to draw conclusions about the policy implications and the effectiveness of the SVR approach. General conclusions about the overall thesis are also drawn.

CHAPTER 2 - GREEN SPACE LOSS - PROBLEM CONTEXT

2.1 Introduction

Green space values have been more widely recognized since the 1960s. However, there still exists a lack of understanding and appreciation for green space functions which contributes to the continued loss of green space and the continued conflict in values between preservationists and developers (Stutz, 1989). This chapter briefly examines the problem context; the environmental impacts of green space loss are discussed along with some of the socio-economic and institutional reasons for green space loss. Lack of values incorporation into decision making is not the only reason for the loss of natural areas. By examining the problem context, this chapter recognizes the complexity of the situation and lays a foundation for chapter 3, which provides a rationale for preserving green space and for incorporating values into the decision-making process.

2.2 Impact of Green Space Loss

Green space loss results in many environmental impacts. Landscapes are transformed and there is increased pollution and risk of flooding, decreased biodiversity, and a disruption in ecological balance (Smith, 1993; Gill and Bonnett, 1973). This section briefly describes the environmental problems of green space loss. It avoids extensive detail since section 3.3 examines all green space values and indirectly exposes all the impacts of green space loss.

2.2.1 Transformation of the landscape

The major force behind green space decline is urban development. As populations grow, their need for urbanized areas also grows. British Columbia's Greater Vancouver region in particular is experiencing significant demand for developable land. Between 1961 and 1981, the region's developed urban area expanded by about 45,000 acres; an average of 2,200 acres of land per year were developed for residential, commercial, institutional and industrial uses (GVRD, 1990). During the period from 1974 to 1993, approximately 9700 acres of agricultural land that was placed in the agricultural land reserve was removed and put to urban use (ALC, 1995). In 1990, it was estimated that there was a 14 year supply of land left for single family housing, a 23 year supply of land for multi-family housing and a 25 year supply of land for industrial use

(GVRD, 1990)². These are only rough estimates, but the point is land will be consumed in the next two decades, causing further erosion of green spaces.

This expanding urbanization results in the transformation of the landscape. Most urban areas develop by increasing the density within and extending the periphery, at the expense of open space (McHarg, 1969). Hills and wooded areas are leveled; low-lying basins are filled; soil resources are lost; and waterways are dredged (Stutz, 1989; Whiston Spirm, 1984). Buildings provide a new topography, and pavement provides a new ground surface. With this transformation and neglect of the geological and ecological significance of green space often comes increased hazards, squandered resources and increased costs to residents (Whiston Spirm, 1984; McHarg, 1969).

2.2.2 Increased pollution, heat and floods

The elimination of green space reduces the number of sinks for air pollution. Air quality deteriorates with an intensification of toxic dust and soot, carbon monoxide, carbon dioxide, ozone, and nitrogen oxides (Real Estate Research Corp., 1974; Gill and Bonnett, 1973). Combustion processes combined with increased coverage of the land with impermeable surfaces like asphalt and concrete, leads to increased heat load (UDI, 1993; Leedy and Adams, 1986). Dense buildings block the wind and prevent the dispersion of both heat and air pollution. This combination of pollution and increased temperature produces an altered, unhealthy climate.

Green space removal also results in fewer areas available for absorbing organic and inorganic water pollutants. Natural areas that served as cleansing agents to urban areas' run off are filled and developed. Storm sewers which drain cities' paved surfaces reduce infiltration, prevent groundwater recharge, and lower the level of water beneath the ground. The resultant lowered stream flows concentrate pollutants (Leedy and Adams, 1986).

Floods increase in magnitude with increased urban growth (Whiston Spirm, 1984). Rapid stormwater runoff, reduced permeable surfaces, shallower and narrower floodplains constricted

²Single family housing supply is based on a development rate of 7250 lots per year; multi-family housing supply is based on a development rate of 9350 units per year; and industrial supply is based on a development rate of 400-500 acres per year. These estimates are only approximate due to the variability in accuracy and sources used by each municipality. These figures are subject to changes in zoning designations and resistance by residents to development.

by buildings and clogged by sediments are the cause. Unable to penetrate the impermeable surfaces, rain runs off the surface in greater quantities and more rapidly than rain falling on fields or forest floors. This increased amount of surface drainage conveyed directly to waterways can radically alter the hydrology of streams and rivers (Smith, 1993). The denser the city, the higher the proportion of pavement to plant cover, and the greater the quantity of storm water that reaches streams and rivers in a short period of time. Removal of green space is a major contributor to flood damage downstream (Whiston Spirn, 1984).

2.2.3 Decreased biodiversity

Fewer acres of green space can lead to a reduction in biodiversity (Smith 1993; Leedy and Adams, 1986; Gill and Bonnett, 1973). Development removes varying amounts of natural woodland and native vegetation. Even where some areas are left within a development, woods or vegetation are frequently 'improved' for human use by removal and introduction of new species (DeGraaf, 1986). As a result, the range of native plant species is reduced together with the food supply and habitat of wildlife species (Real Estate Research Corp., 1974).

Studies show that this reduction in food sources and habitat space eventually reduces or eliminates entire populations of certain wildlife species (DeGraaf, 1986; Hench et al., 1986; Leedy and Adams, 1986). Only those animals able to exploit new food sources and shelter can survive (Whiston Spirn, 1984). This reduction in plant and wildlife populations ultimately results in oversimplified ecosystems (Gill and Bonnett, 1973).

2.2.4 Disruption of ecological balance

A single change to the urban ecosystem results in unforeseen repercussions (McHarg, 1969). It is difficult to accurately predict the effects of green space loss on the environment and its inhabitants (Hench et al., 1986), but it is believed that the elimination of green space leads to a disruption of ecological balance (Gill and Bonnett, 1973). Transformation of the landscape, increased pollution, heat energy and flooding, and decreased biodiversity produce an ecosystem very different from the one that existed prior to urbanization. This system is still connected to nature through the flow of natural processes, but it is sustained by massive importation of energy and materials (Whiston Spirn, 1984; Gill and Bonnett, 1973). Continued misunderstanding of the

complexity of urban ecosystems, and disregard for the negative impacts incurred through green space loss will eventually lead to disruptions in the ecological balance of urban environments that may yield irreversible damage.

2.3 Social and Institutional Reasons for Green Space Loss

Green space loss is not solely due to the lack of values recognition and application in land use decisions, although this is a significant factor. This section acknowledges the complexity of the situation and briefly addresses some of the socio-economic and institutional reasons for the loss of natural areas in the urban environment.

2.3.1 Socio-economic considerations

The socio-economic reasons for green space loss relate to society's perception of nature and land, individuals' desire to maximize self interest, and population growth and demands.

Society's Perception:

Our society generally perceives people and their actions to be separate from nature. Land is considered to be a commodity and therefore possesses primarily economic value (Hench, 1986; Taylor, 1981). Because of these perceptions, there is a fundamental lack of understanding about green space functions and their importance. This lack of understanding is common among legislators, economists, the scientific community, and the general public, and has resulted in emphasis being placed primarily on finance, engineering, and efficiency with limited attention being paid to natural features (Levin, 1986).

Individuals' Self Interest:

A significant portion of green space is located on private land. Individual landowners attempting to maximize returns on undeveloped land cannot capture payment for most of the societal benefits provided by green space; landscape aesthetics and enhanced air quality, for example, are not salable items. As a result, the owner's land use decision usually only considers private benefits and costs, and excludes societal benefits and costs. This wealth-maximizing decision framework favors the conversion of green space to uses which provide private market benefits but are not in the best interests of society (Phillips and Veeman, 1987). An excessive amount of development occurs, resulting in less than optimal amount of green space preservation

from society's perspective (Levin, 1986). Ultimately, the remedies and long range costs become the responsibility of the public domain (McHarg, 1969).

Population Growth and Demands:

The growth of most twentieth-century cities has occurred mainly in outlying suburbs, not in the central core (Whiston Spirn, 1984). The Greater Vancouver Region in British Columbia is no exception. The region's population has grown from 1,355,735 in 1987 to 1,705,887 in 1994, nearly a 26% increase (GVRD, 1995a). It is expected to increase to 3 million people in the next 25 years (GVRD, 1995b). As the population grows, demand for land grows, pushing land prices up. Rising land prices lead to a continual search for cheaper land; the undeveloped land base is eroded by urban sprawl and green space is lost (UDI, 1993; Harrington, 1990).

Other factors also contribute to urban sprawl and loss of green space. North Americans' desire to escape the problems of the city and own a single family home in the suburbs is an important factor (Jarvis, 1993; UDI, 1993). In addition, shifts in job location and changes in transportation contribute to the problem (Clawson, 1971; Whiston Spirn, 1984). The industrial movement out of the city centre to the suburbs draws people with it, and highways and the car improve mobility, eliminating the need to stay within the city centre.

2.3.2 Institutional considerations

Green space loss can also be attributed to inadequate and conflicting legislation, policies and programs within our institutional framework.

Inadequate Policies and Legislation

Attempts *are* made to protect and maintain green space. There are community and national based organizations that work to save natural areas within the urban environment. Public agencies become involved and instigate programs to preserve green space. Legal designations can be assigned to certain natural areas to protect and preserve them; examples include biosphere reserves, provincial wildlife management areas, ecological reserves and environmentally sensitive areas (BBCC, 1994; FBCN, 1992). Development cost charges (DCC's) and park space requirements outlined in the Municipal Act, sections 983 and 992 respectively, can also be used to preserve green space. Locally, the Greater Vancouver Regional District (GVRD) is using their

'Major Parks Management Plan' to try to protect some green spaces; certain areas in the region have been earmarked for a 'Green Zone', and are intended to be spared from development (GVRD, 1995). The GVRD also identified green space to be protected under the provincial government's Protected Area Strategy (Richmond Review, 1994a). In May, 1995, under the Lower Mainland nature legacy program, the provincial government, GVRD and municipal governments purchased 11 parcels of land totaling almost 1,000 hectares to be set aside as natural areas (Richmond News, 1995).

Even with this array of protection initiatives, green space continues to be eroded. Lack of specific policies and bylaws to protect green space³, and the sporadic, reactive, and uncoordinated nature of existing initiatives make it difficult to effectively preserve natural areas. In addition, agencies like the GVRD and local councils have limited legal powers and funds to preserve lands. Many of their initiatives do not carry legal weight and only serve as guidelines. In general, the overall institutional framework does not easily and readily allow for the retention of natural areas in urbanizing communities.

Conflicting Policies, Legislation and Programs

Many existing programs, policies, and legislation conflict with preservation attempts and contribute to green space loss. Government programs promote development, zoning regulations promote sprawl, and policies restrict innovative development, thereby contributing to sprawl.

Government programs have enhanced the advantages of owning a home and have acted as a stimulant to housing development. Since the end of World War II, the largest part of housing development has been directed towards single family homes. Current public policies continue to encourage the establishment of single family neighborhoods, even though these policies are no longer relevant to today's culture (UDI, 1993). Single family communities are voracious consumers of land, and the density created is often considered insufficient to make it economical to preserve natural open space (UDI, 1993). Federal programs stimulate suburbanization (Jarvis, 1993; Clawson, 1971) and ultimately contribute to green space loss.

³The only municipality in B.C. that has adopted a comprehensive Environment Protection and Preservation Bylaw is the District of North Vancouver (District of North Vancouver, 1993).

The zoning of land also contributes to the elimination of natural areas. For example, some local governments believe that green space is protected by adopting one-acre or two-acre single family zoning (UDI, 1993). This zoning guarantees the preservation of at least one acre of unbuilt land between houses and conveys a sense of openness, but it provides little or no usable public open space. These zoning laws lead to high rates of urbanization and green space loss since more land is needed to accommodate the demand for housing (Yaro et al., 1990).

In British Columbia, few policies direct growth towards compact forms that preserve green space. The most common policies favor the conventional parcel developments because they are considered to be cheaper and easier to fit into existing street and utility systems; substantial set asides for green space only complicate and raise problems in the development process (Levin, 1986). Ordinances imposing high standards on cluster development discourage compact development patterns and encourage the continued development of single family homes and high consumption of land (Jarvis, 1993).

2.4 Summary

This chapter outlines some of the impacts and causes of green space loss; it is not meant to be exhaustive. Rather, it is meant to expose the main problems that can arise with the loss of green space, and it is meant to show that green space loss is not solely due to lack of acknowledgment and incorporation of values into the decision-making process. However, the lack of values recognition and use is a primary reason for green space loss. If green space values could be defined and used along with other relevant values in the decision-making process, more comprehensive land use decisions could be made, resulting in greater preservation of natural areas. Thus, since the primary focus of this thesis is on green space values and their elicitation, the remainder of the thesis examines green space values and a values elicitation technique that can aid in the development of comprehensive land use decisions.

CHAPTER 3 - GREEN SPACE VALUES - RATIONALE AND PROBLEM CONTEXT

3.1 Introduction

The previous chapter established the problem context of green space loss. This chapter focuses on values. It outlines the general concepts of value, examines documented green space values, and provides a rationale for using values by discussing the importance of values clarification and incorporation in the decision-making process. The current lack of green space values incorporation and associated difficulties are then discussed. Finally, the different methods that can be used to elicit values are briefly noted, which serves as a lead in to chapter 4 where the structured value referendum is examined.

3.2 General Concepts of Value

Values form an important basis from which attitudes, beliefs and arguments are established. It is values that provide the main thrust for specific claims to preserve green space (Berry, 1976). But what exactly is a value? This is a question that has been asked by many different professions, and many different definitions and concepts have been developed (Epstein, 1989; Rokeach, 1979; Williams, 1979). Before the specific values associated with green space are discussed, an overview of the concepts of value is given.

In general, value concepts can be placed under two categories - preference-related value concepts, and intrinsic value. By providing a brief explanation for both values categories, this overview demonstrates the different ways value can be interpreted and ultimately tries to generate an understanding of the general meaning of value⁴.

3.2.1 Preference-based value concepts

Preference-based values factor predominantly in value definitions. When one values something, one is exhibiting a preference for it. The term preference has a frivolous connotation. It suggests the favored as opposed to the necessary. However, in the context of environmental preference, the word takes on a different meaning and importance. It is intimately tied to basic concerns and reflects underlying human needs (Kaplan and Kaplan, 1989). Preferential standards that are developed are organized into a value system which guides each individual in defending

⁴This overview is intended to be brief. For a more extensive discussion on value concepts see Roessler (1993).

proposed choices, selecting objects, choosing among alternatives and resolving conflicts (Williams, 1979).

Preference-based concepts of values also include the interrelated ideas of beliefs, choice and judgment. Epstein (1989) equates values with beliefs. He feels values are beliefs about desirability that organize experience and direct behavior. Given that values and beliefs can be connected, then desirable decisions and modes of behaviour occur when values and beliefs form a firm basis for judgment, which then allows value-informed choices to be made (Walhout, 1978).

A third and final explanation of value that is based on human preference and is a useful definition for the purposes of this thesis is 'assigned value'. This class of value is considered by Roessler (1993) to provide a useful means of guidance for practical decision problems. 'Assigned value' is the expressed relative importance of an object to a group or individual in a specific context (Brown, 1984). Value is conceived in terms of the worth of the object arrived at through implicit or explicit comparisons. The value of the object is expressed in quantitative terms through market mechanisms (monetary measures) or by ordinal (ranked) or cardinal (related to standard) measures (Farnworth et al., 1981).

3.2.2 Intrinsic value

Intrinsic value is a more abstract concept of value. It is not influenced by the prevailing anthropocentric attitude that nature and its corresponding environments are only useful as a means to an end (Callicott, 1987). Rather, people who believe in intrinsic values are concerned with the well-being of other forms of life; all life on earth is considered to have a value in and of itself and not merely for ulterior human purposes or ends. The intrinsic value of local plant and animal communities, for example, are considered to be important enough as a reason for protecting them (Bendick and Rhindress, 1993; Hanson, 1986; Berry, 1976).

Although intrinsic value is important in that it helps to expose the weaknesses in humanistic paradigms, its philosophical nature is too complex to easily incorporate it into the remainder of this thesis. Therefore, in the following section, only the human preference-related theory of values is used for guidance in developing a green space values taxonomy.

3.3 Green Space Values - A Taxonomy

Now that a general concept and definition of value have been established, the specific values of green space can be discussed. As the discussion progresses, the broad definition of value will be reflected in the different green space values.

For years it has been acknowledged that the functions of green space provide a variety of goods and services (Smith, 1993; Gold, 1985; McHarg, 1969). The importance or value of these green space functions is frequently exposed in literature. However, there has been limited attempts by authors to classify all values into a comprehensive structured format. Most of the literature focuses on only one or a few of the key values associated with green space. This lack of orderliness and comprehensiveness is also found when green space advocates present their preservation arguments. In this section, a taxonomy of green space values is developed.

This green space values taxonomy is modeled after the wilderness values taxonomy presented by Craig Roessler in his Master's thesis (1993). Although the elements within the values hierarchy are different from Roessler's, the set up is similar and the same purpose is served. By creating a taxonomy, a more comprehensive understanding of the importance of green space is obtained. A taxonomy allows information on values to be organized into a logically framed and presentable format of related groupings (Haas, 1990); this way people can gain a clearer understanding of what is important to them, and they can communicate their values more effectively. If people are involved in public value forums that include multiattribute utility techniques as part of the value elicitation procedure, the structured values taxonomy is particularly important. It is essential for enabling people to make value tradeoffs, evaluate options and reach comprehensive land use decisions (Haas, 1990; Driver et al., 1985).

In this taxonomy, four major categories of green space values are identified - economic, social, ecological, and sustainability values. Under these categories a wide array of related values are documented - Table 1 on the following page displays the entire hierarchy. Before beginning the discussion on the green space values it is important to recognize that creating a taxonomy is not easy since the values are largely indivisible and their influences are often experienced

simultaneously. However, the benefits obtained by structuring green space values into a hierarchy far outweigh the difficulties and limitations in doing so (Haas, 1990; Driver et al., 1985).

Table 1 - Hierarchy of Green Space Values

Economic Values
Real Estate
Resource
Infrastructure Cost Reduction
Social Values
Cultural Values
Social Values
Psychological Values
Education
Aesthetics
Inner Well-being
Option, Existence and Bequest
Physiological Values
Recreation
Ecological Values
Air - Temperature Modification and Cleansing
Water - Circulation and Cleansing
Land Stabilization
Habitat for Wildlife
Sustainability Values
Ecological Integrity
Social Integrity

3.3.1 Economic Values

Research has shown that green space possesses economic value (More et al., 1986; Gold, 1985; Correll et al., 1978). It can positively impact real estate values; it can be used as a resource to generate income; and it can be used to reduce infrastructure costs. These are the three main areas where green space has been shown to be economically valuable. There are other areas that reveal green space's economic value, but they have not been researched as extensively, and therefore, are not discussed in detail⁵.

⁵Other economic values of green space can be defined in terms of cost savings from compact growth patterns (less sprawl means a greater density of people, less demand for infrastructure, and improved transportation networks), and prevention of development in hazardous areas (Fox, 1990; Gold, 1985).

Real Estate

Green space is considered to be a critical element in the urban economy due to its impact on real estate values (Fox, 1990; Nelson, 1988). Investments in green space enhance the image of the urban surroundings, thereby increasing the marketability and value of local property, as well as the profitability of a development. The real estate values that reflect the existence of green space can be used to effectively quantify the value of green space (Fox, 1990).

There are numerous cases that expose the economic value of green space. For example, in Central Park, New York City, a study found that without the park, the property values of the surrounding neighbourhoods would have appreciated (from 1859-1873) at the same rate as other property in the city - 100 percent - and would have been worth US\$53 million in 1873. However, the actual appraised value was US\$236 million. Income from property in these neighbourhoods, minus the interest on the cost of the land and its improvements was US\$4.4 million (Fox, 1990). Although the analysis was simple and ignored other influential variables such as road improvements, it provides an indication of the significant influence green space has on property value, and reflects the economic value of green space.

More recently the Regional Science Research Institute (1974) used multiple regression analysis to study how 1294 acre Pennyback Park in Philadelphia affected nearby real estate. The study included 336 properties in 16 different housing developments, and held variables like house type and house location (proximity to a retail area, highway or other green space) constant. The results revealed that real estate value had a net increase of US\$3,391,000 which was directly attributed to the green space (Boerner-ein, 1991). Studies by More et al. (1988) yielded similar results; four parks in Worcester, MA affected the value of surrounding property. It was estimated that the property value benefit of the combined four parks (219 acres) produced nearly US\$350,000 of economic benefits annually.

Preserving and maintaining green space can add to the profitability of a development (Hair, 1986). Faraca (1986), a real estate developer, increased the profit in his housing development in Boston by preserving green space. He found that home buyers saw green space as an asset and preferred to live in a setting with natural areas. Locally, a 260-acre development

project on Bowen Island in the GVRD contains an extensive network of trails, green belts, and wetlands; green space preservation increased the value of the lots, and ultimately increased the developer's revenue (BCWNN, 1994).

Resource

Property values and profitability are not the only economic values that green space possesses. It can be economically valuable as a resource (Bendick and Rhindress, 1993; McPherson, 1991). European cities such as Zurich, Paris, Frankfurt, and Oslo manage their forests as a renewable resource (Whiston Spirn, 1984). These urban forests are a significant part of each city's green space and are managed to produce a sustained yield. The profits from timber production pay for forest maintenance, administrative costs, and research. Although the idea of maintaining green space as a resource is not appealing to many people and is often opposed (Whiston Spirn, 1984), it can produce significant economic returns, thereby justifying its existence.

Infrastructure Cost Reduction

Green space is also economically valued for its ability to reduce infrastructure costs. In Woodlands, Texas the town-wide natural open system contains a wooded floodplain and drainage channels that represent a substantial savings over the cost of constructing a conventional storm sewer system; preservation of the natural drainage system saved the developer over US\$14 million (Whiston Spirn, 1984). A study done on Capital Park in Sacramento, CA examined the extent to which environmental services from urban vegetation can substitute for equivalent functions provided by fossil-fuel based technologies. Ranges of annual dollar savings were estimated for avoidance of space heating/cooling, sewage treatment capacity, and stationary source air pollution control systems. The environmental benefits provided by green space ranged from US\$10,000 to \$137,300 (McPherson, 1991).

3.3.2 Social Values

An examination of the benefits people derive from green space shows that rational economic explanations are not the only ones that can be given for valuing green space (Kaplan and Kaplan, 1989). Some alternative explanations for why green space is important can be

attributed to the social values that green space provides. Brown and Manfredo (1987) identified four broad categories of social values: cultural, societal, psychological, and physiological values. Green space functions offer a variety of values under all four of these categories.

CULTURAL VALUES

Cultural values are concerned with the ideas that make up a culture. Our Canadian urban culture considers 'naturalness' to be desirable (Adams and Meredith, 1993). People are willing to invest money and time to protect, simulate or commute to sites with natural elements. Communities that possess green space have natural landscape features that include treed areas and rural settings that are highly valued and in great demand by our culture. These features are preferred to repetitive, geometric, treeless communities. By preserving green space, particularly in the form of green belts, the merging of neighboring towns can be prevented. As a result, each town's identity and character is maintained (Harrington, 1990) and people are given a sense of identity and territoriality which contribute to their culture (Gold, 1985).

SOCIETAL VALUES

Societal values are related to social relationships. Green spaces provide an important context for social interaction (Burgess et al., 1988). They can offer chances for local residents to become involved in small-scale environmental projects. This involvement leads to feelings of pride and achievement and increased awareness of local history (Emery, 1986). In addition, residents' involvement in projects allows them to meet more people who live in their area which helps to foster a greater sense of community (Callander and Power, 1992).

PSYCHOLOGICAL VALUES

Psychological values are derived from the personal well-being that one perceives from the valued object. Green space may be (psychologically) valued for its contributions to education, aesthetics or inner well-being. In addition, green space may be important to some people because it offers option, existence and bequest values.

Education

Green space can serve as a means for connecting people with their environment. It is easily accessible and offers an opportunity for people to learn about ecological functions and the

importance of other living organisms as part of environmental systems (Smith, 1993; Schicker, 1986). Green space used as a laboratory can help children and adults better understand how to live with and minimize their impacts upon natural systems (Tylka and Cook, 1986). Increased awareness of the local environment can lead to an increased sense of protectiveness for local resources (Callander and Power, 1991; Schicker, 1986).

Aesthetics

Green space offers aesthetic benefits. Its use as a structural framework to produce edges, focuses, and character in a city offers an effective means of visual relief from the built environment; it is considered essential for creating an attractive and pleasing living environment (Jarvis, 1993). For over twenty years researchers have studied preference for specific landscapes and compared viewer preferences among them (Kaplan and Kaplan, 1989). It is generally agreed that people's preferences are broadly predictable. Scenes showing human influence such as built elements receive low preference ratings while scenes containing natural landscapes receive high preference ratings. In particular, scenes with trees and green, park-like landscapes receive the highest preference ratings (Schauman, 1986). The visual value of green space is important because green space's future often depends on the public's reaction to its appearance.

Inner Well-being

Urbanization and population growth have made it difficult to achieve peace and quiet, and the chance to reflect - basic satisfactions that are important to people (Kaplan and Kaplan, 1989). Natural areas in the urban environment, however, make these satisfactions more readily achievable (Callander and Power, 1992). Green space can elicit restorative experiences similar to those experienced in the wilderness - tranquillity, self reliance, and closeness to nature (Kaplan and Kaplan, 1989). Participants in studies by Bardwell (1985) and Kaplan and Kaplan (1989) considered natural areas to be valuable for providing a place to forget their worries, to reduce their stress levels, to regain sanity and to enjoy solitude.

Kaplan and Kaplan (1989) cite a study conducted in 42 municipalities across the United States that found a significant relationship between neighborhood satisfaction and an individual's perceived degree of life satisfaction. Satisfaction with both categories was higher for those

individuals who more frequently pursued nature-related activities near their homes. The strongest predictor of residential satisfaction was the ease of access to nature.

Study's have even underscored the role that green space can play in child development (Burgess et al., 1988; Schicker, 1986). Natural areas can provide a place that is well suited to a child's development in creativity and decision making. Emery (1986) notes that in one study, participants saw their urban woodland as a resource providing links with past childhood. The woodland influenced resident's development of identity with place and community, stimulating feelings of security and a desire to stay in the area.

Option, Existence and Bequest

In addition to the above psychological values, there are values associated with the non-use of natural environments such as option, existence and bequest values (Phillips and Adamowicz, 1986). Option values result from a desire to be able to use natural environments in the future. Regardless of whether or not the option to use a green space area is exercised, there is a value to maintaining it for future use (Walsh et al., 1984). Existence values result from a desire to ensure natural environments exist regardless of use or option values (Berry, 1976). Well being may be enhanced just by knowing that green space will continue to exist in a given area apart from any desire to benefit personally from it now or in the future (More et al., 1988). Finally, bequest values arise with the knowledge that a natural environment will be available for the enjoyment of future generations. Satisfaction regarding one's responsibility to future generations is obtained by knowing that green space will continue to exist (Walsh et al., 1984).

PHYSIOLOGICAL VALUES

Recreation

Physiological values pertain to the improvement of the health and function of the human body. Green space provides a chance for recreational activity that is perceived to enhance health through exercise and stress reduction (Callander and Power, 1992). For the majority of people, employment, education, culture and leisure activities take place primarily in an urban setting. Green space can be essential to those without the means to leave urban areas for recreational activities. It offers the opportunity for people to experience freedom, diversity, or enrichment

through activities like walking, jogging, and wildlife observation. Green space helps fulfill people's biological need for contact with the natural environment and their psychological need for contrast and change in spatial surroundings (Gold, 1985).

3.3.3 Ecological Values

The importance of green space is not only expressed in terms of economic and social values, but it is also expressed in terms of ecological values. People who live in cities, towns and suburban communities live in urban ecosystems that require the importation of energy and materials to function successfully (Smith, 1993). Processes like heat gain and loss, photosynthesis, and hydrologic and nutrient cycles govern this movement of energy and materials (Whiston Spirn, 1984). Green spaces are natural ecosystems within urban ecosystems that aid in the processing of energy and materials. Their arrangement, management and preservation can have important effects on landscape function (Smith, 1993). Specifically, green space's ecological processes can improve urban microclimates, air quality and water quality, and they can reduce the hazards of flooding and land slides. In addition, green space can provide habitat for wildlife (Tylka and Cook, 1986).

Air - Temperature Modification and Cleansing

Green space contributes to both climate modification and air quality management. In the urban environment, temperatures are usually higher than in the surrounding countryside (Whiston Spirn, 1984). These higher temperatures are largely due to urban activities and the replacement of natural plant cover. Combustion from transportation, manufacturing and electricity generation produces heat which is absorbed and retained more quickly and in greater quantities by materials like concrete and asphalt than by plants, soil and water. By maintaining green space these urban microclimates can be modified (More et al., 1988; Gill and Bonnett, 1973). Natural areas that contain trees for example, prevent heat gain and encourage heat loss by blocking direct sunlight, reducing heat absorption in surrounding surfaces and its subsequent reradiation, and encouraging evaporation (Whiston Spirn, 1984).

Green space can also buffer residential neighborhoods from air pollution (Callander and Power, 1991). It provides sources of cleaner air than the surrounding urban areas because the

soil, its micro-organisms, and the vegetation help to filter out fumes and dust; carbon monoxide, ozone, sulphur dioxide, and heavy metals like cadmium are some of the pollutants that can be removed (McPherson, 1992). The control of air emissions alone may not solve urban air quality problems. Green space is needed to provide natural sinks for air pollution and to help improve the overall urban climate.

Water - Circulation and Cleansing

By maintaining green space, vegetation and soil are left untouched; it is the capacity of the vegetation and the soil and its micro-organisms to absorb water and filter the elements within it that prevents floods and protects water quality (Berry, 1976). Green space can act as natural flood storage, detaining stormwater from surrounding impermeable surfaces, thereby reducing floods. Boston's 'Emerald Necklace' park system is noted for its importance as a means of flood control and water quality maintenance. A third of the system was designed primarily to combat the flooding and pollution problems of Boston's Back Bay tidal flats. Locally, the marshes on Lulu and Sea Island in the GVRD accommodate increases in water levels caused by spring (May-July) runoff and/or tides of the Fraser River (GVRD, 1992).

Green spaces also act as groundwater recharge areas (Jarvis, 1993; Whiston Spirn, 1984). The community of Woodlands, Texas uses their green space to maintain water quality and recharge the aquifer that underlies neighboring Houston. Studies indicate that the water quality of urban runoff in the phase one portion of the town's development is better than that of other Houston residential areas (Whiston Spirn, 1984).

Land Stabilization

Green space retention can help stabilize ground that is susceptible to slippage. Maintaining tree and plant communities reduces the infiltration of surface water into a slope, dries out the surface soil, and binds it with their roots (Whiston Spirn, 1984). Within the GVRD, forested areas along the North Shore Mountains and Surrey's Panorama Ridge are prime examples of green spaces that protect steep slopes from erosion and subsequently reduce the hazards of landslides and damage to surrounding development (GVRD, 1992).

Habitat for Wildlife

Although green spaces are often not large enough to be completely self-sustaining systems, they are still able to support significant wildlife populations (More et al., 1988). Small stands of native woodland often feature heavy concentrations of small birds and mammals (Lyle, 1986). Locally, it is estimated that there are a dozen species of song birds that migrate from the North Shore mountains each winter to the Grandview Cut - an 11-block long gorge in East Vancouver (Vancouver Sun, 1991). It is believed that without the Cut, there would be significantly fewer songbirds in east Vancouver. Green space that is comprised of wetlands or marsh, often support species like amphibians, reptiles, and waterfowl. The marshes on the GVRD's Iona, Sea and Lulu Islands are vital areas of food and shelter for migratory waterbirds that use the banks as a stopover and wintering ground (GVRD, 1992).

Corridors of green space can serve as transportation networks, expand the possibilities of habitat choice, and encourage a greater abundance of species (Lyle, 1986). Green spaces with waterflow networks are particularly rich with species diversity. The Coquitlam River floodplain in the GVRD contains a narrow strip of forest that lines the banks; it forms a corridor of virtually continuous natural habitat that provides terrestrial wildlife with a transportation route connecting the Coast Mountains with the Fraser River (GVRD, 1992).

3.3.4 Sustainability Values

In order to achieve sustainable development, economic initiatives will need to be integrated with environmental constraints so that the ecological base is maintained and the needs of current generations are met without sacrificing the needs of future generations (WCED, 1987). More specifically, ecological and social integrity must be maintained if sustainable development is to be achieved (Hough, 1989; Gardner, 1988). The green space values that are outlined under the previous three categories of economic, social and ecological values can all contribute to the maintenance of both ecological and social integrity. Thus, by combining all the benefits of green space, it can be said that green space offers sustainability values.

Ecological Integrity

Maintenance of ecological integrity will involve maintaining essential ecological processes and life-support systems, preserving genetic diversity and ensuring sustainable use of species and ecosystems (Gardner, 1988). Preservation and maintenance of green space can contribute to the maintenance of ecological integrity. Green spaces' abilities to modify microclimates, improve air and water quality, reduce natural hazards and provide habitat for wildlife all help to maintain ecological integrity, and thus play a vital role in ensuring sustainable development (Smith, 1993; Laurie, 1979).

Social Integrity

Preserving green space helps to promote social integrity in the urban environment (Hough, 1989). The quality of life implies, among other things, being able to choose between one environment and another. Social integrity is represented by communities that have a wide array of wildlife and vegetation, and possess noisy and quiet places, cultivated and natural landscapes. These communities are more interesting and pleasant to live in than communities that are devoid of this richness. Preservation of green space helps to maintain and protect this diversity and promote a sense of place (Hough, 1989). It also helps achieve the ideal of 'communities in tune with the natural environment', where impacts on natural systems and processes are minimized, and where these same systems and processes are harnessed to give more economical and, in the longer term, more sustainable communities (Barker, 1986; McHarg, 1969).

3.4 Values Incorporation into Decision-making Processes - Rationale and Problem Context

The taxonomy created in section 3.3 clarifies the values that can be associated with green space and it shows that green space is not a homogeneous good. Rather, green space serves a variety of purposes. Given that green space values do exist, they should be incorporated into decision-making processes, for these values, if acknowledged and harnessed, represent a powerful resource for shaping a beneficial urban habitat. The following two subsections discuss the importance of values clarification and use in decision-making, and the current problem of lack of values incorporation. The final subsection provides an overview of the approaches that can be used to elicit values.

3.4.1 The significance of clarifying and incorporating values

Clarifying and incorporating values is important for a number of reasons⁶: it helps to set priorities; it recognizes there will be tradeoffs when making land use decisions; it can promote a better understanding of the complexity of the situation and lead to the development of more comprehensive, effective decisions; and it provides a means for advancing decisions that work toward sustainable development.

Within our present system of resource allocation, values play a key role in determining what actions policy makers and the public will take. The expression and use of value judgments associated with green space can help determine the criteria or objectives that matter in a decision. It ultimately helps set priorities for planning, development and management of green space. It can also help to characterize the range of preliminary viewpoints regarding tradeoffs associated with green space retention versus conversion to other uses (McDaniels, 1994c). The scarcity of natural resources like green space and the increasing demands of an expanding population make it impossible to satisfy all interest groups needs and desires. Successful valuations help to promote efficient and equitable tradeoffs (Roessler, 1993).

Clarifying values or preferences for the environment promotes a greater understanding of the complexity of the decision at hand; it creates a greater awareness of the impacts the alternatives may have on values; and it can even direct the focus to a particular area of the decision problem (Keeney, 1988; Keeney, 1982). By using the clarified values, the objectives of different interest groups are represented, conflicts can be resolved, more attractive alternatives can be created and more effective decisions can be made (McDaniels, 1994c; Wichelns et al., 1993; Keeney, 1992).

Development in a sustainable manner implies new methods for managing environmental relations (Adams and Thomas, 1993; Rees, 1992). Management must be concerned with people's responses to local problems and opportunities, for their responses reflect both their perceptions and their values. By eliciting, examining and incorporating all types of values and not just those

⁶Section 3.3 touched on some of these reasons during the discussion on the significance of the values taxonomy. This subsection will expand further on the importance of values clarification and incorporation.

focusing on short term financial concerns, decisions can be made that may make sustainability possible.

With decision making, there is no such thing as a completely objective or scientific approach - values are an important part of the decision process (Keeney, 1988). Thus, clarifying and incorporating values is essential if environmental decision making is to be responsive and effective. By understanding values, recognizing differences in values among interest groups, and acknowledging that tradeoffs are inevitable, value conflicts can be resolved (Keeney, 1988), settings can be designed and maintained for diverse users (Kaplan and Kaplan, 1989), and social well being for both present and future generations can be improved (Phillips, 1983).

3.4.2 The current situation - lack of values incorporation

It is obvious from the previous subsection that values are important for effective decision making. However, typically, little effort is made to determine the full range of values important for a given decision (Keeney, 1992). Although there are cases where green space values have been recognized and green spaces have subsequently been preserved (Adams and Leedy, 1986), in general, little has been done to elicit, structure and incorporate green space values into land use decisions (McPherson, 1992; Barker, 1986). Typically, when development is proposed for a piece of land, there is a clash of values between pro-development and pro-green space groups. The end result is exclusion of green space values, domination of pro-development values, an ineffective land use decision and the continued loss of green space. Dorney (1974, 45) stated, 'We are too often left with environmental quality 'motherhood' statements, defensively trying to protect remnant ecosystems (albeit important) and winning a skirmish here and there, but essentially being overwhelmed by sophisticated information systems generated by other professionals from their specific viewpoints.'

In most cases, land use decisions have been predominantly based on utilitarian and short term economic values (Hanley and Knight, 1992). Many landowners and developers argue that preserving green space is not that important for the well being of people or the environment; it only serves to hinder material progress and economic development, and adds to the cost of doing

business (Rowe, 1990). They also argue that programs that try to prevent development will deprive them of monetary appreciation of their properties (Stutz, 1989).

Green space advocates' values that relate to social well being, natural ecosystems and/or sustainability, are less easily articulated and heard, and therefore have limited influence on land use decisions (Harrison et al., 1987). Even the financial costs accrued by the public both in terms of ecological and social costs are rarely considered; private gain provides the impetus to develop even if the total ecological and social costs are in excess. Arguments based primarily on property rights and short term private economic benefits are normally strong enough to defeat any resistance.

Admittedly, clarification and incorporation of all interest groups' values is not easy. Values associated with short term economic gain are the easiest to express in most decision-making settings. Green space advocates may try to voice their conflicting views, but the diversity of green space values, the difficulty in measuring them within our present system of resource allocation⁷, and the shortage of means to incorporate them into decisions on land use alternatives all contribute to the lack of values incorporation. In addition, uncertainty complicates the valuation exercise (Norton, 1988). Insufficient knowledge of the exact ecological benefits of green space (and the subsequent impacts of its loss), the economic impacts of green space preservation, and the needs and preferences of future generations add to the complexity of values incorporation.

Essentially, there has not been a well-directed effort by society or the tools to make it possible for society to become involved in urban land use decisions as they relate to green space preservation. As a result, urban land development decisions continue to be primarily left up to the individual landowner with little government intervention through effective decision-making processes, policies and programs. However, as previously noted, the use of values is important. If public policy is even remotely concerned with preserving open space, attempts should be made to incorporate a multidimensional set of values in making the most effective land use decision (Harrison et al., 1987; Berry, 1976). The following subsection presents an overview of the values

⁷Most green space goods and services are non-commensurable and intangible which makes them difficult, if not impossible, to measure strictly in terms of economic efficiency.

elicitation techniques that have been or could be used to elicit and incorporate green space values into land use decisions.

3.4.3 Approaches used to elicit values - an overview

In order for green space values to be of any use in the decision-making process, their quantitative or qualitative significance must be determined using a viable elicitation technique. The results will allow comparisons to be made between the preference measures of green space values and preference measures of conflicting values; both must be weighed in any specific land use decision process. There are a number of non-market value elicitation techniques⁸ that have been or could be used to structure green space values. These techniques possess indirect and direct approaches to eliciting values.

INDIRECT NON-MARKET VALUE ELICITATION APPROACHES

The value of a green space good or service may be estimated indirectly by examining the price paid for a closely associated good or service that is traded in a market. The travel cost method and hedonic price method, two techniques within social benefit-cost analysis, are the two most common indirect non-market value elicitation approaches (More et al., 1988).

Travel Cost Method

In the simplest terms, the travel cost method assumes that the economic value of benefits is equivalent to the cost of travel (McPherson, 1992). This method has had limited application with respect to green space - it has been applied to large urban parks, and forest- and canal-based recreation (Hanley and Knight, 1992). This method does not work well when variation in travel and cost are small, as for a neighborhood park (McPherson, 1992). This method also has an inability to handle the numerous non-use values which have been ascribed to green space. Thus, the travel cost method's shortcomings limit its use in valuing green space commodities.

Hedonic Price Method

The hedonic price method infers green space benefits from the cost and price of related market transactions (McPherson, 1992). The premise is that land prices should reflect the extra

⁸The majority of green space benefits are exogenous to the supply and demand functions of competitive markets; they have no prices to reveal the quantitative strength of peoples' preferences for them. To address this matter, non-market elicitation procedures have been developed.

amount people are willing to pay for land that benefits from green space attributes. Hedonic pricing has been widely used; section 3.3.3 reflects this method in the discussion of green space's influence on property values. Its strength lies in its ability to capture some of the external benefits that occur off-site (McPherson, 1992). However, its key weakness is that property price differences may not adequately measure green space benefits since vegetation effects are hard to distinguish from the many other variables influencing real estate prices (More et al., 1986).

The significant weaknesses found in both indirect elicitation methods have led to the promotion and increased use of alternative valuation methods such as the two methods based on direct values elicitation outlined below.

DIRECT NON-MARKET VALUE ELICITATION APPROACHES

Another way of eliciting and measuring the non-market values of green space is to involve participants directly in either a hypothetically-derived market or public involvement process where they can express their values by answering a set of questions. This process of directly eliciting values can be carried out in different frameworks. The contingent valuation method and multi-attribute value technology are two such frameworks.

Contingent Valuation Method

The contingent valuation method (CVM) is a collection of techniques within social benefit-cost analysis (McDaniels, 1994b). The CVM develops a realistic hypothetical market for an unpriced good or service, and asks people how much they are willing to pay (WTP) for or are willing to accept (WTA) compensation for a change in the quantity or quality of the good or service (Gregory et al., 1993). In general, the value of the good or service is estimated by multiplying the average of these expressions of value by the number of consumers (Gunton, 1991). This valuation approach has been the most extensively used for valuing green space (Hanley and Knight, 1992). The advantage of the CVM is that it is a flexible tool that can be applied to any type of non-market resource problem. This method does have limitations though.

The CVM has been noted for biases and other problems that undermine its accuracy and reproducibility. It can have design biases (stemming from the characteristics of the questions), motivational biases (intentionally injected into the measurement procedure), and cognitive biases

(unintentionally introduced distortions) (Roessler, 1993). Empirical studies have shown substantial discrepancies between WTP and WTA measures of value, which economists say should not be the case (Gregory and McDaniels, 1987). In addition, Gregory et al. (1993) argue that the approach imposes unrealistic cognitive demands on respondents. Often benefits and costs are difficult to quantify or are not known. It is even questionable whether a single quantified measure can represent all relevant values. These are some of the key weaknesses of the CVM; Roessler (1993) provides a thorough review of all the CVM's documented problems.

In general, the indirect methods and contingent valuation method have limited utility for policy-makers, planners, and managers because the underlying values they estimate only indirectly reflect the flow of multiple benefits and costs (McPherson, 1992). The following approach offers an opportunity to overcome these weaknesses.

Multiattribute Utility Technology

Multiattribute utility technology (MAUT) is a collection of models and techniques that underlie the practice of decision analysis⁹ (Gregory et al., 1993). It provides a means of quantifying and analyzing complex individual preferences among decision alternatives that vary on multiple conflicting objectives. Several MAU elicitation techniques have been designed to measure values of objects or outcomes which have different dimensions or attributes of value. All the techniques possess the following five steps (von Winterfeldt and Edwards, 273, 1986): 1. Define alternatives and value-relevant attributes; 2. Evaluate each alternative on each attribute; 3. Assign relative weights to the attributes; 4. Obtain an overall evaluation of alternatives by aggregating the weights of attributes and the single-attribute evaluations of alternatives; 5. Perform sensitivity analysis and make recommendations.

MAUT has a number of strengths. It provides a constructive process that clarifies, structures and measures values - clear structures are developed where values are linked to measurable attributes and tradeoffs between the attributes can be measured. MAUT offers a means of separating the value side from the factual side of the policy problem, and allows the

⁹Decision analysis is a term used to describe a normative framework and set of systematic procedures and methods developed to rationally analyze complex and uncertain decision problems and provide guidance to decision makers (Keeney, 1982).

subjective components of values to be considered explicitly and coherently (McDaniels, 1994c). This separation allows the implications of differences between stakeholder values to be thoroughly explored, and the uncertainties to be more carefully represented. MAUT also facilitates communication and provides a basis for resolving conflicts. It ultimately improves the decision process by providing the tradeoff information that policy makers need when making difficult decisions (Keeney et al., 1990).

This method is not without weaknesses; they include the cost, time and specialized knowledge needed to elicit the information, the hypothetical nature of the tradeoff questions and the difficulties that laypeople may have in answering them (McDaniels, 1994c; Keeney et al., 1990). However, simplified versions of multiattribute value elicitation like SMART (simplified multiattribute rating technique) can be used to overcome these problems (McDaniels, 1994c).

3.5 Summary

In order to address the conflicts that arise over development and green space preservation, and in order to make the most effective land use decisions, it is important for all concerned groups to understand the significance of values. Chapter 3 tries to address this issue by first establishing a general concept of value which serves as a foundation from which to build a green space values taxonomy. The taxonomy exposes the wide array of green space values and ultimately provides a rationale for why there should be concern for green space loss. Next, a rationale is provided for clarifying and incorporating values into the decision-making process. The current problem of the lack of clarification and incorporation of the full range of values is then discussed and the associated difficulties are acknowledged. Finally, a range of possible elicitation techniques are presented that can be used to incorporate values, resolve conflicts and make tradeoffs in land use decisions. This overview of techniques is important for it shows that all techniques have their strengths and weaknesses in terms of their potential to clarify values associated with preservation decisions and to guide decision makers in land allocation decisions. This overview also serves as a lead in to the values elicitation method that is the focus of this thesis - the Structured Value Referendum (SVR).

The SVR is a relatively new approach that underlies the practice of decision analysis and incorporates MAU techniques. It can be used to elicit and measure a full range of values, including green space values, and can help decision makers make informed tradeoffs. The proceeding chapter discusses the process involved in developing an SVR and its usefulness in eliciting, structuring and incorporating values to make informed tradeoffs and land use decisions involving the preservation of green space.

CHAPTER 4 - THE STRUCTURED VALUE REFERENDUM - A METHOD TO ELICIT VALUES & PLACE THEM IN A DECISION FRAMEWORK

4.1 Introduction

The previous chapters have established the problem context of both green space loss and the lack of values incorporation in land use decision-making processes. It is obvious that values are an essential part of the decision-making process, and in order to improve this process, useful procedures are needed to elicit public values. Techniques that incorporate as many relevant preferences as possible, promote in depth consideration of what is important, and provide a framework from which alternatives can be readily selected are highly desirable in today's world where complex policy decisions are abundant (Keeney, 1982). Section 3.4.3 briefly outlined some of the valuation techniques that could be or have been used to clarify and incorporate green space values in making land use decisions. This chapter examines another technique, the structured value referendum (SVR), which has potential for structuring green space values in a useful manner. Chapter 4 provides a definition of an SVR, steps through the development process, discusses the judgments that are needed for SVR implementation, and evaluates its effectiveness as a means of eliciting public preferences in complex policy decisions. The technique will be then be employed in a case study in chapter 5.

4.2 Defining a Structured Value Referendum

4.2.1 A definition

A structured value referendum is a voting-based structure that elicits public preferences. It can be defined as 'a vote involving a choice among several structured policy alternatives, based on quality information' (McDaniels, 1994b, 4). The concept of an SVR has only recently been developed; it was used in 1992 by McDaniels (1994b) to clarify preferences about the best level of sewage treatment for the Capital Regional District (CRD) in British Columbia. It is believed that voting could serve as a democratic and concise means of expressing preferences especially in decisions where preferences are difficult to obtain, such as decisions that affect non-market goods like environmental quality (McDaniels, 1994b). However, the use of voting as a preference elicitation tool for provision of non-market goods has seen only limited application (Deacon and Shapiro, 1975). It has primarily been used in referendum surveys within the CVM (Cameron,

1988). In a slightly different light, Kline and Wichelns (1994) recently used referenda data to make inferences about preferences for preserving farmland.

An SVR offers a decision structure where each voter assimilates technical information and makes a choice among *several* well-defined alternatives, given information on the benefits and costs of each. This is a more informative approach than the traditional yes/no referendum¹⁰ where only one alternative is involved. Making the choice involves explicit tradeoffs among objectives that are important to voters. The final vote that is placed by each citizen reveals value judgments in terms of public preferences for the structured decision alternatives; this is where McDaniels (1994b) derives the term *structured value referendum*.

4.2.2 Criteria necessary to use an SVR

As with any values elicitation tool, there are always certain policy contexts that are more suited to the technique than others. Such is the case with an SVR. The most suitable policy contexts for an SVR are those where the public decision problem can be readily identified and structured, a group of distinct alternatives can be developed, and their impacts can be determined and conveyed to the public (McDaniels, 1994b). In addition, an SVR is most useful in situations where explicit public input into a controversial issue is desired, and public support for the decision is needed. Complicated policy decisions that can not plausibly present meaningful alternatives are ill-suited to the SVR structure. Some possible policy contexts include decisions about levels of spending on specific public services, or decisions involving transportation issues and land use patterns (McDaniels, 1994b). Land use issues involving decisions about preserving green space could also benefit from an SVR.

4.3 Developing a Structured Value Referendum

Now that a definition and criteria have been established, the process of developing and conducting an SVR can be discussed. This process is likened to a simplified version of decision analysis for a public policy decision (McDaniels, 1994b). An SVR uses the decision analysis framework and a set of problem structuring steps and tools known as value-focused thinking¹¹ to

¹⁰The traditional referendum can be defined as a direct popular vote to approve or reject a proposed or existing governmental policy or institution (Ranney, 1981, xi).

¹¹Value-focused thinking concentrates more and earlier on values. With value-focused thinking, alternatives are considered as a means to meeting objectives, rather than the focus of the decision problem (Keeney, 1988a).

elicit value judgments; the SVR approach embraces the following steps: (1) identify the decision to be made; (2) clarify the objectives that should be achieved in making the decision; (3) identify the alternatives; (4) determine the impacts of the alternatives on the objectives; (5) evaluate the attractiveness of the alternatives' impacts; and (6) evaluate and compare alternatives and select the preferred alternative (McDaniels, 1994c). This framework and associated steps and tools are crucial for developing a set of underlying objectives that are important to voters, for constructing alternatives, and for preparing information on each alternative. The key difference with this simplified version is that preference elicitation is done on a large scale by choosing among alternatives rather than eliciting individual or group utility functions¹². Below, the steps in the development process of an SVR are discussed. They entail structuring the objectives and alternatives, determining the impacts of the alternatives, structuring the questions and the vote, and developing an information program.

4.3.1 Structuring objectives

Structuring objectives that are important to voters is the first and key step in creating an SVR (McDaniels, 1994b). Structuring objectives, or eliciting values, can: (1) determine what is important to stakeholders when they choose among the options; (2) clarify the measures that capture differences among the options; and (3) identify preliminary priorities among objectives (McDaniels, 1994b). In order to structure objectives, small group sessions can be held, where communication is facilitated by clarifying individuals' understanding of the issue. Other more extensive means like a multiattribute value tree (von Winterfeldt and Edwards, 1986) can also be used to clarify people's understanding and their objectives. This structuring process involves interviewing individuals or groups to develop objective hierarchies or value trees that represent perspectives of various stakeholders; the people expressing the values need not be the same as those facing the problem (Keeney, 1988a). Questions clarify the fundamental ends of interest of the decision. The individual hierarchies are then combined into a single value tree. This tree advances from general statements of value at the higher levels to more detailed value statements at lower levels (von Winterfeldt and Edwards, 1986). Next, performance measures (attributes)

¹²Essentially, the steps in this simplified version establish an elicitation context that requires less precise judgments by participants. Please see section 4.4.2 for further discussion on this issue.

are elicited and assigned to each of the lowest-level objectives; attributes measure the degree to which each objective is achieved (Keeney, 1988a). The assigned attributes should serve as useful summary measures of impacts that are readily understood by voters (McDaniels, 1994b). A final task involves conducting preliminary value assessments to clarify priorities or tradeoffs.

4.3.2 Structuring alternatives and determining their impacts

Structuring Alternatives

Once the objectives are established, alternatives can be structured and their impacts determined. Structuring the objectives before the alternatives can lead to better, more creative alternatives (Keeney, 1982); it also helps determine the details that should be emphasized when documenting the impacts of the alternatives, and it clarifies the most effective means of communicating these impacts. Technical information from experts is combined with the information gained from values elicitation to develop alternatives that meet the concerns of voters. The alternatives must be achievable and distinct enough to provide relevant tradeoffs among key objectives. Within the set of alternatives that are presented on the ballot, there can be a 'do-nothing' or status quo option. Other alternatives could provide incremental improvements in performance of the objectives (over the status quo) at greater cost (McDaniels, 1994b).

Structuring the alternatives is considered to be a complex task (McDaniels, 1994b). It is impossible to provide both a comprehensive list of alternatives and make it easy to effectively choose among the alternatives. The more alternatives there are, the more complicated and difficult it becomes for voters to make meaningful comparisons. Thus, there will be tradeoffs between completeness and understandability in selecting the number of alternatives (McDaniels, 1994b). An attempt must be made to address both issues by keeping the structure simple, manageable, and descriptive of the problem environment (von Winterfeldt and Edwards, 1986). This way the integrity of the process is maintained.

Determining the Impacts of the Alternatives

Once the alternatives are structured, their impacts can be assessed (Keeney, 1982). It is the impacts on the objectives that are of most concern; they may involve ecological, social and/ or economic impacts. Technical studies are employed at this stage and any uncertainties are

accounted for. Using the already established attributes, technical experts can provide ranges of the worst to best performances of the alternatives for each objective. Priorities (tradeoffs) are then set among the objectives from each participant's perspective, assuming an additive value function (Keeney, 1988a). The Simplified Multiattribute Rating Techniques (SMART) (von Winterfeldt and Edwards, 1986) is an effective means of establishing the tradeoffs. 'Swing weighting' techniques (a version of SMART) can also be used; numerical weights are placed on each objective, assuming an additive value function (McDaniels, 1994b).

4.3.3 Structuring the questions and the vote

With the objectives and alternatives identified, and insight gained regarding what details about the impacts to emphasize and communicate, the questions and vote can be structured.

Structuring the Questions

Important decisions must be made regarding how the questions are structured. Firstly, the specific wording of the questions must be carefully considered, for this determines how the alternatives are structured; one way the questions can be designed is to show alternatives that offer incremental benefits and costs. The specific wording also determines the implied reference point that voters can use to evaluate options. A reference point is a basis for comparing benefits and costs. It can significantly influence people's judgments regarding the value of gains and losses, and dramatically affect the attractiveness of alternatives (McDaniels, 1994b). A communicated reference point can provide voters with insightful comparisons. It can be based on the status quo or it can be based on a condition in the future. It may even be beneficial to compare the alternatives from more than one reference point (McDaniels, 1994b). If referendum designers do explicitly choose a reference point, it must be chosen and communicated carefully. How voters view the reference point must be researched, though it may be difficult to accurately determine individual choice of reference points (Fischhoff et al., 1980). In addition, if voters have already selected clear reference points, efforts to affect their views may be futile.

A decision must also be made with regard to the type and extent of information to include on the ballot paper about the benefits and costs of the alternatives. The provision of information can reduce the complexity of the issue for the voter. However, the longer and wordier the

information, the greater the demands that are placed on the voter (Bowler et al., 1991). Thus, the format for information provision must be given serious consideration. These formats can range from no information on the benefits and costs of each option, to extensive descriptions. Although attempts should be made to convey information objectively, it may in certain cases be impossible to 'objectively' convey facts about the benefits of each alternative.

Research indicates that the wording of questions, and the description, detail and number of alternatives can significantly influence voter judgments (Magleby, 1984; Butler and Ranney, 1978). If question structuring is done effectively, it can allow voters to judge the relative desirability of the benefits and costs of each option as well as who gains and who loses, thus giving explicit consideration to distributional effects (McDaniels, 1994b).

Structuring the Vote

There are two important decisions that need to be made when structuring the vote. The first relates to the voting rule. There are two different voting schemes that can be considered. The plurality approach may be adopted where voters vote yes for one of the alternatives. This is the more conventional approach that is familiar to voters. The second scheme is approval voting, where the voter identifies all options that are broadly acceptable. Approval voting may offer advantages over plurality voting in that it allows the voter to identify more than one alternative, and it poses a relatively simple cognitive task (McDaniels, 1994b)¹³.

The second decision involves deciding who to target with the SVR. The kind of impact the vote has must be decided on; it may be a universal vote or a poll. An SVR conducted as a universal vote is useful because it involves a large number of people, and it encourages voters to work hard in making their decision because they know their judgments will have a substantial impact on themselves and others. A key difficulty that may arise though, is that different groups may try to control or interfere with the process. Alternatively, an SVR can be conducted as a poll where a random sample of voters is taken. This poll can serve one of two purposes. It can be used to obtain the views of key interest groups that are important to the decision maker; the degree of complexity of the individual preferences is revealed, tradeoff information is provided,

¹³See section 5.4.3, p.58 for further discussion on approval voting.

and an indication is given regarding how various groups would choose among the alternatives (McDaniels, 1994b). A partial poll can also be used to represent aggregate public opinion; this way the level of cost and possible controversy may be lower than with a universal vote. Using an SVR as a poll does have drawbacks in that people may not be as motivated to participate, and the political impacts of the results are not as great.

4.3.4 Information program development

Before the day of the vote, a large-scale information program is used to educate the voters on the issue at hand. The success of an SVR depends on the ability of the voters to understand the policy context, the alternatives and their impacts, the primary tradeoffs, and the voting task at hand (McDaniels, 1994b). The type and amount of information received by the public beforehand can influence their perception and understanding of the issue (Magleby, 1984). Thus, a communication program that clearly outlines the entire issue in an engaging and neutral manner is important in helping people from different cultural and education backgrounds make informed judgments about the different options. There are a variety of techniques that can be used to convey information; print and electronic media are both popular mechanisms. Different approaches were used in the wastewater treatment SVR. One of the most notable was an 'objectives by alternatives matrix' which is a problem-structuring tool used in decision analysis (von Winterfeldt and Edwards, 1986); this information program provides a comprehensive picture of the situation. Objectives and attributes which can be derived from workshops are placed in a matrix along with clearly outlined benefits and costs of each alternative on each objective. By comparing the incremental costs and benefits of the options, this program provides voters with an informative means for making decisions.

4.4 Judgments Required for SVR Implementation

When an SVR is implemented, judgments must be made by both political decision makers and voters. The former group must make judgments when deciding on key aspects of an SVR, and the latter group must make judgments when choosing among alternatives. It is important to understand the nature of these judgments if an SVR is to be conducted effectively in a political environment (McDaniels, 1994b).

4.4.1 Political Judgments

Referenda are frequently viewed as opportunities to acquire or contest power (McDaniels, 1994b; Hahn and Kamieniecki, 1987). Due to the political nature of referenda in general, an SVR is automatically placed within a politically charged environment, making this values elicitation approach distinctly different from other approaches. There are at least three aspects of an SVR where political judgments arise.

The first aspect relates to who has control over the questions; rarely do analysts gain complete control of question development. It is usually the political decision makers that have final approval of the questions, and they may even play a significant role in creating the questions. This political control adds to the complexity of the design. It is important that all participants who are involved in structuring an SVR realize that they have the potential to bias the results of the SVR through their efforts and the influences of other stakeholders.

The second aspect where political judgment can arise has to do with who gets to vote. As already noted in section 4.3.3, an SVR can be conducted as a universal vote or as a poll. Both offer advantages and disadvantages. It is up to the political decision makers to decide what is the most effective and appropriate strategy. If political leaders want to keep the level of costs and controversy low, and they want to gain insight into public reaction, applying the SVR as a poll is most appropriate. However, if the decision makers want to understand the full impact of the decision, then using the SVR as a universal vote will provide the desired response.

The final aspect involving political judgment arises when deciding how to use the voting results. These results can either be binding or non-binding. In the former case, voters are legally empowered to make the policy decision. In the latter case, the results are used to give advice; they do not enact change, but give authority to legislature to bring it about (Butler and Ranney, 1978). The preference judgments guide the decision makers in making the most appropriate decision. The combination of who votes and how the results are used significantly affects the impact of an SVR. For example, a binding universal vote is considered to have the most substance, legitimacy and political impact (McDaniels, 1994b).

These are the three key areas where political judgments are necessary. The choices that are made by the political decision makers have a substantial impact on the usefulness and effectiveness of an SVR. Whatever the combination that is used in the final SVR design, it should always provide an indication of public preference of the policy decision at hand.

4.4.2 Voter Judgments

Voter preference judgments are expressed by selecting among available alternatives. These judgments require less precision and cognitive effort, and are more readily accomplished on a large scale than the cardinal judgments involved in preference elicitation methods like the CVM and MAUT (McDaniels, 1994b). In multiattribute value assessment, for example, participants must be able to rank order objectives, order the differences between objectives and assign cardinal measures of worth that are meaningful in terms of ratios - a process requiring much more precision than an SVR. Judgments in an SVR only entail making paired comparisons with some standard, and possibly making transitive comparisons between the member of same pairs to partially order the alternatives. Fischhoff (1991) notes that for large groups of the population, preferences can be expected to be poorly formed. Therefore, tools like the SVR which obtain preferences at a less precise level of measurement are desirable.

Depending on whether the voter participates in plurality voting or approval voting, the judgments they must make may differ slightly. If an SVR has plurality voting, the voter must identify the best alternative by partially ordering the alternatives based on binary comparisons regarding benefits and costs. With approval voting, the voter must group the alternatives into acceptable and unacceptable sets (using binary comparisons) which are judged relative to an 'acceptability' threshold. Judgment may also involve partial ordering of the alternatives if the acceptability threshold is established at the least preferred alternative (McDaniels, 1994b).

Although judgments in SVRs do not have to be as precise as other techniques, making binary comparisons between options that may have a wide array of benefits and costs, and deciding on the most preferred option still requires thought. Voters may choose the best alternative based on the one that is most flexible and responsive to a range of situations, or they may make their choice based on one aspect of the alternative that is superior to the aspects of the

other alternatives. As will be discussed shortly, this latter method may be considered to result in status quo 'bias' in selecting among alternatives. Voters may also choose the option by heuristically comparing the increments in benefits and costs; the one that is most cost effective is chosen¹⁴. From this discussion it is shown that although the judgments required by a voter in an SVR do require some thought, they are less precise and cognitively demanding than other valuation approaches. This reduced precision in judgment does have a drawback which is discussed in the following section.

4.5 An Evaluation of the SVR

Now that the SVR structure has been established, an evaluation of the SVR's strengths, weaknesses, and overall effectiveness can be made.

4.5.1 Strengths

The key strengths of an SVR are that it acknowledges and includes people's values that are relevant to the situation, it tries to make the policy issue as easy to understand as possible, and it provides individuals with the opportunity to easily express their preferences. To clearly outline these strengths, they are discussed under three major headings.

Strengths Associated with the Structuring Process

By employing decision analysis' problem structuring steps and the concept of value-focused thinking during the development of an SVR, complex policy issues can be addressed, a communication process is facilitated and insight into the issue is gained. Values are elicited that can be used to establish the referendum structure. Essentially, by using decision analysis as a framework, the benefits associated with using decision analysis can also be attributed to the SVR; multiple objectives of different groups are considered, intangibles are accounted for, explicit factual judgments from experts are promoted, uncertainties and long time horizons are addressed, value tradeoffs are accounted for, and creative alternatives are identified (Gregory et al., 1993). In addition, because the development process uses decision analysis it is not subject to the same kinds of ethical and procedural criticisms as the CVM: the subjective components of values are

¹⁴It is important to note that the option the voter chooses may be influenced by socioeconomic considerations like social status and education level. For purposes of this thesis it is sufficient just to mention the importance of these considerations; Hahn and Kamieniecki (1987) provide extensive discussion on this issue.

considered explicitly and coherently (Gregory et al., 1993); focus is not placed strictly on one objective of economic efficiency; and when structuring the objectives, the values for non-market goods do not have to be expressed solely in terms of dollar value in order to make tradeoffs. The SVR's ability to include an array of objectives depending on the desires of particular groups, makes it a flexible tool that can be applied to a variety of situations.

Strengths Associated with a Referendum Technique

Using a referendum technique offers a number of advantages. For example, referenda have been used widely and are broadly accepted. They provide a familiar and legitimate basis for public decisions (McDaniels, 1994b; McClendon, 1990). Voting is considered to be a democratic and concise means of expressing personal preferences, and voting within a referendum is considered to be the most democratic and legitimate means of making public decisions (Butler and Ranney, 1978). This technique appeals to both voters and politicians. It allows citizens an increased voice in the selection and implementation of policy alternatives (Hahn and Kamieniecki, 1987). It can help give politicians a quick clear picture of where people stand on a particular issue and provide an assessment of political power (McDaniels, 1994b).

The context in which the decision is set (i.e. in a referendum) makes it easy for people to understand the policy issue (The Economist, 1993). The structure of the referendum allows the alternatives to be clearly displayed and their impacts documented in a neutral manner which further facilitates people's understanding of the issue. In order to conduct the analysis it is not necessary to explicitly value intangible effects, as is the case with contingency valuation and multiattribute value assessment. Voters can consider the characteristics of alternatives in 'natural units' like hectares of land and select the one that is most preferred (McDaniels, 1994c). In addition the cost implications of the vote are clearly indicated. The payment mechanism for the good, which is usually through the tax system can be readily understood (McDaniels, 1994b).

Using a referendum provides a political context that is not hypothetical; this motivates voters to make informed judgments. The judgment task and decision is likely to be made with great consideration. When individuals are asked to choose among alternatives based on the different costs and benefits, they are likely to give serious thought to the decision because their

choice may have significant impacts on them, the general public, and their environment (Hahn and Kamieniecki, 1987). As was previously discussed, this judgment task also requires less precision than with valuation approaches based on cardinal judgments.

Finally, the use of a referendum offers the advantage over other valuation methods, in terms of the number of individuals who can be involved in the preference elicitation process. Methods like MAUT and the CVM are only feasible for small groups or workshops. In situations where people have a right to express a view on a policy issue, an SVR provides the chance for popular demand rather than a select group of representatives to decide the issue.

Advantages Over a Conventional Referendum

In conventional referendums there is only one alternative provided, and the voter must decide whether to reject or accept it (yes/no). A problem with this set up is that voters begin to think that there must be another way of getting the same benefits without the associated costs (McDaniels, 1994b). Another problem is that often voters would prefer a variation on the alternative, but not the exact one being offered (Magleby, 1984). An SVR addresses these problems by providing several alternatives from which the voter can choose.

The primary objective of an SVR is to obtain informed judgments about public preferences. Because this is the main reason why decision makers instigate an SVR, the information presented to voters and the wording of the questions may be more neutral than in conventional referenda (McDaniels, 1994b). The presentation and content of the information can also help to focus voters' attention on issues of greatest importance like the key value tradeoffs, and prevent voters from being distracted and drawn to less important or irrelevant issues.

4.5.2 Weaknesses

The following discussion outlines the key weaknesses associated with the development and process of an SVR.

Complexity and Limited Opportunities for Feedback

A number of issues can arise during the development of an SVR that can add to the complexity of the process and may impact the effectiveness of the valuation technique. For example, the unavoidable participation of political decision makers in the creation and final

approval of questions makes the task of referendum design more organizationally complex, and could even curtail the ability of analysts to implement SVR designs (McDaniels, 1994b). This complexity may be added to by groups that do not have authority to intervene. The political judgments that must be made by the decision makers with regard to who gets to vote, and how the results are used also adds to the complexity of the SVR design and implementation process.

The complexity of the issue and the questions may make it difficult for the participant in the objectives structuring phase (Gregory et al., 1993) and the voter at the voting phase to answer effectively (Bowler et al., 1991). Often there is a substantial level of learning to be done by the participant and/or voter; an inability to learn may alienate the participant/voter, and even discourage participation (Magleby, 1984). Considerable specialized knowledge may be needed to structure the objectives and the alternatives effectively. However, techniques like SMART can be used to reduce the level of complexity in the structuring phase. Since the intention of an SVR is to make choosing among options as straightforward as possible, the degree of complexity facing the voter should be minimized if efforts are made to structure the referendum clearly.

In addition to complexity, another limitation of the SVR is that the final referendum provides less opportunity than valuation approaches like multiattribute value assessment for restructuring, feedback, and learning by the participants and the analysts. This is due to the one-time nature of the value assessment in a referendum (McDaniels, 1994b). However, the structuring of the objectives and alternatives in the development stages do provide opportunities to clarify and restructure the key objectives and alternatives.

Time and Cost

The planning and development of an SVR can be time consuming and costly. The CRD sewage treatment SVR took over a year to develop and cost approximately Cdn\$1million (McDaniels, 1994b). Time and cost factors are attributed to obtaining feedback from workshops and experts, designing the referendum, and preparing and distributing communication materials. The high cost may deter frequent use of universal SVRs. However, the cost of SVRs can be reduced if they are combined with another vote. It is important to note that other value elicitation

techniques can also be costly - using the cheapest method may not be the best method, since the purpose of incorporating values into decision-making may not be effectively achieved.

Inability to Measure Preference Intensity

As with other valuation approaches, an SVR has the ability to elicit public preferences. This preference is measured based on the choice the voter makes after information and probabilities are processed, informal judgments are made about the utility of each alternative, and the ballot is cast. The compilation of all judgments or votes for each alternative reflects the relative societal preference. However, a weakness of referendum data is that they do not register the *intensity* of preference (McDaniels, 1994b; Cameron, 1987). Conventional referendum results do not measure the intensity of the negative or affirmative vote (Hahn and Kamieniecki, 1987) and SVR results do not measure the intensity of the preferred option. Other valuation tools like the CVM and MAUT are able to register intensity. The CVM uses WTP values as measures of preference intensity and their total sum represents relative social preference (Mishan, 1981). MAUT combines probabilities and utilities for a decision maker to give subjective expected utility maximization (intensity of preference). There are only certain restrictive conditions where referenda are able to register preference intensity, and they are unlikely to always hold in practice (McDaniels, 1994b). Thus, alternatives that are selected through voting mechanisms, may not maximize aggregate net benefits in utilitarian terms (Portney, 1973). However, based on the strengths of an SVR as outlined above, a referendum technique still seems to be a legitimate and effective means for eliciting public preferences. In addition the 'one person one vote' rule may even be viewed as fairer than welfare maximization in making public decisions because of the horizontal equity among voters; horizontal equity has been shown to be important in other fairness judgments (McDaniels, 1994b).

Less Information Conveyed

Although there are advantages to requiring less precision in preference judgments there is a drawback; less precision results in less information being conveyed to the analysts and political decision makers. The results obtained from multiattribute value assessment and the CVM offer significantly more detailed information. These results can be used in different policy contexts and

the impacts of a wide array of alternatives can be studied. An SVR is not as flexible a tool for policy analysis. It is restricted to eliciting values for a specific set of alternatives, and it is a one time deal; analysts do not have the freedom to manipulate the referendum structure to see what variations in preferences can arise. However, it is possible for the SVR to be conducted as a survey rather than a universal vote, and value functions could be derived. Taking this route, though eliminates the political impact of an SVR, which is one of the elements that makes it so different from other valuation approaches.

Failure of Referenda in General

It is believed that referenda may not be that useful a tool for selecting among alternatives. There are a number of problems that may be associated with referenda. For example, there is the problem with them being perceived as involving bias toward the status quo¹⁵ in selecting among alternatives. However, McDaniels, (1994b) provides an effective argument against this suggestion. He first offers a behavioral explanation for these status quo effects by citing Kahneman and Tversky (1979). They suggest that because voters may weight the prospective losses of one aspect or objective more heavily than the technically equivalent gains on other aspects, they may tend to favor alternatives like the status quo, that have no apparent or less apparent losses (loss aversion). McDaniels (1994b,11) then provides a straightforward explanation for status quo effects in referenda: ‘..there are likely to be many alternatives not as attractive as the status quo.’ Thus choosing the status quo may indicate practical concerns and understandable behavioral perspectives rather than bias.

A second possible problem involves opposing groups controlling the information provided to voters and using the referenda as political campaigns (Callies and Curtin, 1990). Control has been exerted over the wording of the questions, the type of alternatives, and/or the background information in order for certain groups to achieve political ends. Even when opposing groups do not play an active role in influencing the referendum structuring, often referendum designers are influenced by those who control the questions, which can lead to controversy over the specific

¹⁵Status quo bias is considered to be a deeply rooted decision-making practice stemming partly from a mental illusion and partly from psychological inclination. Most decisions have a status quo alternative, which is to do nothing or maintain one's current or previous decision (Samuelson and Zeckhauser, 1988). Samuelson and Zeckhauser provide a detailed review of possible explanations for the status quo bias.

wording of the questions. These serious issues have been addressed in many states that hold conventional referenda; strategic control of referenda is granted to concerned groups so that they can determine the wording and explain the benefits and costs (Hahn and Kamieniecki, 1987). McDaniels (1994b) notes that the control of information can be used in an effective manner to develop a well-structured decision and communicate neutral information to the general public. Informed judgments could then be made and the large scale preference elicitation would be successfully achieved.

A third problem relates to voter turn out. The success of a conventional referendum or an SVR depends on voter participation. With certain conventional referenda low participation has been a problem, but on the whole, turnout has not been much lower than each nation's normal level of involvement in elections (Butler and Ranney, 1978). In the CRD's wastewater treatment SVR, only about 24% of the region's registered voters participated. With no other vote taking place that day this turnout was considered by CRD officials to be reasonably good. The key to addressing this problem may be to combine the SVR with another substantial vote.

Other problems associated with referenda are that their outcomes may be determined by extraneous issues rather than by the merits of the questions - in other words voters may mark their ballots in a manner that will 'get back' at the local establishment (The Economist, 1993). In addition, referenda are considered by some to cause a weakening of representative government. Using referenda to test the public pulse for decision-making purposes removes some of the legislature's power, which can result in the loss of popular respect. Officials are likely to behave less responsibly, for their behavior is adversely affected by the knowledge that anything they do may be overridden by a referendum (Hahn and Kamieniecki, 1987; Butler and Ranney, 1978). Because the SVR provides more detailed questions than a yes/no referendum and because it is less likely to be used as frequently, it will probably be less susceptible to these problems.

4.5.3 Overall effectiveness

The above discussion has exposed the strengths and weaknesses associated with the SVR. Based on the literature review, it is believed that the SVR's strengths outweigh its weaknesses. The SVR can serve as a useful tool for eliciting values and deciding on issues, and it allows for

effective public participation. It offers additional benefits over more conventional techniques like the CVM in that it stimulates interest and participation in the political process. Many of the SVR's weaknesses can be addressed, but ultimately, the application of this technique will be more suited to certain policy decisions than others.

With regard to the SVR's ability to elicit green space values and aid in effective land use decision making, this technique has great potential. The SVR appears to offer an appropriate means of understanding what roles green spaces play in people's every day lives in urban areas. The structure of the SVR can provide an opportunity for green space values, as well as other values, to be incorporated into developing alternatives that meet the needs of the public, and the preferences expressed through the voting mechanism can help political decision-makers make the most effective decision. The judgmental advantages, democratic involvement, and political appeal of an SVR could ultimately aid in the preservation of green space.

4.6 Summary

This chapter has discussed one method that may be used to elicit values and place them in a decision framework. The structured value referendum was defined and its development process described. Based on an evaluation of the technique it has been concluded that the SVR can elicit, clarify and incorporate public values into the decision-making process; these values can then be combined with scientific facts and uncertainty and used to aid decision makers in choosing the most appropriate option based on public feedback. The SVR facilitates the development of a well structured decision that contains relevant information on values held by key groups, as well as relevant technical information. This allows the decision maker, in this case the voter, to make a wise choice among the alternatives. Based on this literature review, the SVR has potential to be modified and applied to a variety of situations. Due to its relatively recent introduction, however, it has had limited use, and has yet to be applied to a land use allocation decision. In chapter 5, an SVR is used to elicit public values on a green space preservation issue, and its effectiveness at aiding a land use decision is evaluated. Thus, the feasibility of using an SVR in a complex decision problem is assessed.

CHAPTER 5 - USING AN SVR TO ELICIT PUBLIC VALUES FOR GREEN SPACE - OVERALL RESEARCH DESIGN

5.1 Introduction

The previous three chapters documented the problem contexts of green space loss and the lack of comprehensive values incorporation into land use decision-making processes. Green space values and the use of all relevant values in decision-making processes were also discussed. Various techniques for eliciting values were described, and the SVR approach was discussed in detail. In this chapter, the SVR approach is applied to a case study. The objectives and expectations of the empirical work are first outlined and the case study is described. The SVR procedure and set up are then documented and the results presented. In the final chapter, the overall effectiveness of the SVR is discussed, policy implications are noted and general conclusions are drawn.

5.2 Objectives and Expectations of the Empirical Work

To clarify the purpose of this case study, the objectives are defined. Thoughts on what may occur during the study are also presented.

5.2.1 Objectives defined

There are two objectives of this case study; both help to meet one of the purposes of this thesis. The first objective is to use the SVR approach to elicit all relevant values, including green space values, that are important in making a land use decision. This approach should help to expose people's awareness of and characterize the importance of the role of green space. The second objective, which is addressed in chapter 6, is to evaluate the effectiveness, feasibility and overall usefulness of the SVR approach in aiding land use decision-making processes with regard to the case study and in general.

5.2.2 Expectations outlined

Some thought has been given to the possible outcome of this empirical study. My expectations are as follows:

- 1.) The limited scope of a Master's thesis will result in the development of an SVR that is not as comprehensive as one that would be developed in a real situation. The amount of time and the extent of the procedures that are used to elicit values, develop the options and document their

impacts will be less extensive. If more time was spent on the structuring process, and on developing an information program, which is not carried out, possibly more detailed options could be developed, and a more accurate representation of values would occur. Nevertheless, the structuring process and final referendum should yield some interesting results.

2.) By applying the SVR approach to a specific parcel of land, the green space values that are elicited in the structuring process and expressed through voting may not be as extensive as the values taxonomy that was discussed in chapter 3; this is acceptable since not all green spaces offer the same benefits.

3.) The options and impacts that are developed and presented in the referendum will provide voters with an opportunity to express their preference for green space, it will help to clarify what is important to them in terms of the type of green space and it will indirectly expose their awareness of the importance of the role of green space.

5.3 Case Study - Terra Nova, Richmond, B.C.

This case study is based on a land use/green space preservation decision for land that is part of Terra Nova, in Richmond, B.C. This particular case study was chosen for four reasons:

1. Terra Nova is readily identifiable to the majority of Richmond residents;
2. Terra Nova possesses one of the few remaining large parcels of potentially publicly accessible green space in Richmond;
3. there are public land use decisions that must be made with regard to the future use of the Terra Nova green space, hence the SVR that is developed is based on a realistic issue; and
4. application of an SVR is appropriate, for the policy issue meets the criteria outlined in section 4.2.2. The problem can be readily structured; a group of distinct alternatives can be created and their impacts can be forecast and conveyed to the public; and this issue should have public input since some of the land is already publicly owned, and the land use decision will impact the public.

Given these reasons, the case study's background and current situation can be discussed; this discussion provides further rationale for applying an SVR to this case study.

5.3.1 Background

Located next to Vancouver, Richmond encompasses 51.4 square miles of land area that is comprised entirely of deltaic islands. It is surrounded by the Fraser River Estuary which supports a variety of species, including a yearly average of 800 million juvenile salmon and 500,000 water birds (Jamieson, 1992). Richmond's lowland creeks, which flow from grasslands, bogs, forests and freshwater marshes feed into the estuary waters. These natural areas are an integral part of the ecology of the Fraser River estuary. Since the 1950s, Richmond, like other areas in the lower mainland, has been subject to urbanization. The population has grown from 108,490 in 1986 to about 143,000 in 1994 (RPD, 1994), and over half of the land area is now urban or in transition. This urbanization has resulted in the loss of significant tracts of natural areas, often with the disapproval of Richmond residents. The Terra Nova lands is one case in particular where many residents opposed development and attempted to preserve the green space. However, they were essentially unsuccessful. Below is a brief account of the events that have surrounded Terra Nova.

Terra Nova is comprised of 340 acres and is located in the northwest corner of Richmond at the mouth of the Fraser River. Prior to 1987, the entire area was designated as part of the Agricultural Land Reserve (ALR); the land was used for farming and it provided habitat and feeding grounds for wildlife. However, in 1987 an amendment was made to the city's Official Community Plan, designating two-thirds of Terra Nova as residential despite strong opposition from Richmond residents; over 7000 names were gathered on petitions requesting Terra Nova remain in the ALR, and 23 nights of public hearings were held (Callow, 1990). Although the fight to save the green space went to the Supreme Court of Canada, the council's right to make the residential designation was upheld. Today, over 200 acres have been or are in the process of being developed for residential use. The remaining 100 acres, however, are still agriculturally zoned and were given an 'under study' designation in Richmond's Official Community Plan. These acres have the potential to remain as green space. A decision to preserve this land could help the Richmond council meet its goal to have 6.5 acres of parkland per 1000 residents. Currently, Richmond has a deficit of parkland amounting to 363 acres (based on 1992 figures)

which is believed will increase by another 370 acres in the next 15 to 20 years if projected population levels are met and efforts are not made to preserve green space (SRFS, 1994).

5.3.2 Present situation

Presently, the city owns approximately 51 of the 100 acres that have the potential to be preserved as green space. 34 of the acres are located in the southwest quadrant of Terra Nova. In September, 1993, Richmond's council approved a plan to begin acquiring land from the remaining 66 acres which are still privately owned in the northwest quadrant (Richmond Review, 1994c). The city currently owns approximately 17 of the 66 acres. If council continues to purchase this land (which is uncertain, and would occur over a number of years) it is faced with making a decision with regard to the land's most suitable use. Council has indicated that at least some of the land will be preserved. The 34 acres in the southwest quadrant are currently being considered for some kind of park; the type has yet to be decided. Public officials will be requesting input from citizens on the 34 acres before December, 1995. As for the remaining 66 acres, no attempt has been made to elicit feedback from the public on what they feel would be the best use of the land. This case study focuses on the entire 100 acres. Since a land use decision on the entire 100 acres will affect the public, and since this land could ultimately be used by the public, concerned citizens should be able to express their values and have input. There are a number of land use options that could be chosen. These options involve tradeoffs between green space preservation and development. There is an opportunity to preserve a large parcel of land that could benefit people and the environment. However, by preserving this land, an opportunity to develop it and accommodate other uses, such as housing, are foregone.

This is a complex decision problem that requires extensive thought and the use of both technical information and public values. This decision problem is very suitable for an SVR case study. The SVR approach could help Richmond's planners and council to clearly define the policy decision, structure objectives and alternatives, determine the impacts, clarify and incorporate values from voters, and make an effective land use decision. Following is a discussion of the SVR development for this case study.

5.4 SVR Development - Procedure and Set Up

Before proceeding with the structuring process, the policy decision is clarified. Since there are a number of options available for this 100 acres of land, the decision shall be cast as 'What is the best use of the 100 acres of undeveloped land at Terra Nova?' Given this decision, the SVR development can begin. The process involves eliciting values and structuring the objectives. Based on the responses, alternatives are developed, their impacts are determined, and a referendum is developed that contains a question, alternatives and a description of the consequences involved in choosing each alternative. The referendum is then distributed to a random sample of 200 voters. Once the ballots have been marked and returned, the results are documented. The following subsections detail this development process.

5.4.1 Structuring the objectives - eliciting values and attributes

In order to gain an understanding about what consequences matter in deciding the best use for the Terra Nova green space, values were elicited from three groups of people. The first two groups each contained four Richmond residents. Their length of residency ranged from 12 years to 30 years. Ethnic backgrounds, gender, ages and education levels were varied. The third group was comprised of two planners from the City of Richmond - a parks planner and a land use planner. The goal in the sessions was to clarify what the participants felt was important in making a land use decision, and to provide an opportunity for values relating to green space preservation to be expressed. Each session was informal and loosely structured¹⁶.

The sessions with the first two groups occurred on June 16 and 17, consisted of two parts and took approximately 1 hour each¹⁷. At the beginning of each session the reason for involving the group was clarified, the commitment needed from each individual was specified, and the use of the results was explained. It was stressed that no consensus was required among the participants. In the first part of the session a written definition of green space was provided, and participants were asked to spend 15 minutes addressing the question 'What role does green space play in Richmond? How do you use this green space?' A short list of similar questions was also

¹⁶If this structuring process was for a real referendum, the groups would be larger, they would contain a variety of stakeholders and there would be a more elaborate elicitation process like the multiattribute value tree technique.

¹⁷For complete details on the information given to participants in all three sessions, please refer to Appendix I.

provided to help participants think about green space. This first 15 minutes prepared the participants for the second part of the session, where they were given a written description of the Terra Nova case study, and they were asked what they thought was important in making the land use decision. They addressed the question 'What should be considered when deciding what to do with the 100 acres of green space at Terra Nova? Discuss and articulate.' A short list of similar questions was also provided to encourage discussion. Participants had 10 minutes to write down the key objectives from their viewpoint. This step allowed individuals to think about what is important and avoided anchoring of one individual's judgments on the initial stated judgments of another individual. Each participant was then asked to discuss their objectives and explain their importance; this discussion helped to further refine the objectives. A common list of objectives was developed; no attempt was made to set priorities among the objectives. At the end of the session the participants were told that in a few weeks they would be asked for feedback on the final referendum in terms of how readily they understood the question, options and impacts.

Following these sessions, the lists from the two groups were combined and structured. The guidelines suggested by Keeney and McDaniels (1993) were used to organize the values so that a more useful set of fundamental objectives could be constructed to aid in the development of the alternatives and their impacts. Sets of words with similar meanings were combined, objectives moved from general to specific, and no prioritization was given to the objectives.

This list of objectives was then assigned attributes so as to help define each objective, and to provide a means of understanding the impacts of the alternatives. Ideally, attributes should be developed in discussion with stakeholders, but insufficient time was available. Thus, attributes were assigned before presenting the planners with the list of structured objectives on July 17. During this one hour session the question from the second part of the previous sessions was shown to the planners, and the structured objectives were presented. The planners were asked to discuss any other objectives that might matter in making the land use decision.

5.4.2 Structuring the alternatives and determining their impacts

It was originally intended that the planners help develop the alternatives, but busy work schedules prevented this from happening. Thus, potential alternatives and their impacts were

developed before the third session; an effort was made to create alternatives that were distinct enough to provide relevant tradeoffs among key objectives, were feasible, and would meet the concerns of voters. A partially completed objectives by alternatives matrix was presented to the planners for feedback. The planners' technical knowledge and awareness of uncertainties plus available data were combined with the value information, and used to refine the alternatives and clarify the impacts. If this was a structuring process for a real referendum, extensive time and effort would go into determining the impacts. Analytical methods would be used to represent uncertainties with probability. An attempt was made in this study to be as comprehensive as possible, but highly technical studies were not conducted. Once the alternatives and the impacts were finalized, structuring of the question and the vote began.

5.4.3 Structuring the question and the vote

Structuring the Question

Structuring the question is an important stage of the SVR development process. As was noted in section 4.3.3, the wording of the question, and the description, detail and number of alternatives can significantly influence voter judgments. In addition, the question itself influences how the alternatives are structured and the implied reference point that voters use in evaluating the options. Thus, a strong effort was made in this case study to effectively structure the question and provide straightforward information on the options and consequences so that voters would have the opportunity to judge both the relative desirability of the benefits and costs of each option, and who gains and who loses. Context information was also used to help people focus and effectively address the question.

Structuring the Vote

Structuring the vote is also important for it determines the overall impact of the SVR. With regard to deciding on the voting rule, approval voting was chosen. Voters were asked to identify all acceptable options, rather than just one. The alternative that is given the most votes would be the one chosen in an actual SVR. Research by Brams and Fishburn (1983) indicates that approval voting has advantages over plurality voting: approval voting provides the voter with more flexible options and thereby encourages a truer expression of preferences than plurality

voting; since voters are better able to express their preferences, increased voter turnout could be encouraged in a real SVR; approval voting helps choose the strongest option which is derived not from being the favorite of the largest fraction of voters, but rather from having broad-based appeal in the entire electorate; and it presents voters with a relatively simple cognitive task. The problems associated with this approach seem to be applicable only to voting for candidates in elections. Since this voting rule is relatively untested, and since it appears to offer advantages over plurality voting, it was used in this case study.

With regard to deciding who to target, a universal vote was not feasible. Thus, a random sample of 200 voters was taken. Ballots were randomly distributed to 200 people at two shopping malls and the Minoru Cultural Centre in Richmond. Participants were asked to just complete the referendum and feedback questionnaire. They were not required to leave any details regarding name, address, age, gender or ethnic background. Although this information may have been useful when analyzing the results, this case study was intended to be as close to a real voting situation as possible. Thus, asking participants for personal information was not desirable or necessary for voting purposes.

5.4.4 Feedback on the SVR

One of the reasons for conducting this SVR case study is to evaluate the effectiveness and feasibility of the SVR approach. In order to make this evaluation as comprehensive as possible, feedback on the technique's usefulness was obtained from the voters. After placing their vote(s), participants were asked five questions to solicit their views on the approach. The first four questions were of a general nature and involved assessments on the basis of a seven point scale - 1 reflected most favorably on the approach and 7 reflected least favorably. The fifth question asked voters which option they preferred if they could vote for only one.

5.5 Results

5.5.1 The objectives structuring process - values and attributes elicited

Part I - Green Space Values

Part I encouraged people to think about the values of green space. Participants were able to relate back to these values when they addressed the second part of the session. The values

expressed by both groups were similar to the hierarchy of green space values outlined in Table 1, chapter 3. Appendix II contains the complete list. Group 1 emphasized the recreational value of green space. All members found green space to be particularly important for relieving stress, socializing, and passive recreation. They also agreed that bigger, more natural parks were superior to the smaller sports-oriented parks since the former offered areas for wildlife to exist, and provided more opportunities for feeling removed from the urban environment. Members of group 2 had more varied viewpoints. Two participants felt privately owned green space (i.e. backyards) was more important than public green space (i.e. public parks). The strongest emphasis from this group was on the importance of green space as a means of reducing pollution and as means of offering recreational opportunities. Disagreement arose with regard to whether green space was useful for wildlife. Two members did not believe wildlife can coexist with people. The other two members felt wildlife could coexist and helped to maintain a balanced ecology. Despite the disagreements, all participants articulated their values well, and a comprehensive list was developed.

Both groups expressed the need for varied green space that contained a large element of natural unmanicured areas. Manicured sports fields and baseball diamonds were considered to offer few green space values. All members agreed that they did not want to see any more of these parks in Richmond - at least not in large quantities. The only two values that were not mentioned in the discussions was the economic value of green space as a resource and as a means of reducing infrastructure costs.

Part II - Objectives for Terra Nova Land Use Decision

The objectives that were elicited from the two groups were similar, and therefore, will be discussed together. Appendix III contains the responses that were used to develop the structured objectives list shown in Table 2, on page 62. This list has been refined and slightly reworded. Also, the objectives 2.0, 8.0, 10.0, 12.0, and 13.0 that were elicited from the groups are not explicitly placed in Table 2, but they are accounted for. Objective 3.0, which was concerned with offering a fair price to the property holders of the private parcels, is not listed since the current zoning of the land should account for this objective. Objective 14.0 which was concerned with

public opinion is not listed since this process of structuring and holding a referendum does account for a fair public process. During the third session (with the planners), this table was examined, and any possible changes were considered. The planners did not feel any changes were needed. Thus, from this table it can be seen that the major objectives in deciding about land use at Terra Nova should be to: minimize adverse environmental impacts, promote green space preservation, minimize adverse impacts on surrounding residents, equitably meet the recreational needs of the entire community, minimize economic costs to the taxpayer, maximize revenue to the city, consider the demand for and current availability of different land uses, and maximize compatibility with the community plan.

Attributes Assigned

Attributes are also present in Table 2. Objective 8 was not assigned an attribute since it is concerned with the nature of the planning process, not the options. Objective 4 is measured in terms of the number of recreational activities available, and the number of people who can use the land. Objectives 5 and 6 have attributes assigned in terms of average annual household property tax increase, and net change in annual taxes. Objective 7 is also assigned quantitative measures; meeting housing needs is measured in terms of the number of new dwelling units, and the need for sport facilities and parks is accounted for in objective 4 (future demand was too difficult to explicitly address). Unloading park congestion is measured in terms of number of acres of parkland per 1000 residents. Green space preservation values are less readily measured. Physical descriptions of the changes in the area are used in place of quantitative estimates of how these changes would affect the green space objectives. A descriptive assessment of the impacts entails describing the amount of area that is affected by the option, the extent of human intrusion, visual changes, and any construction process impacts. The attributes concerned with the environmental impacts and the impacts on surrounding residents are also less easily assigned; there are no readily defined natural scales. Thus, constructed scales were developed. The scales define the range of impacts, using scenarios that range from the best possible to worst possible outcomes for each option. These scales are presented on page 63.

Table 2 - Structured Fundamental Objectives

<u>Environment</u>	<u>ATTRIBUTE</u>
1. Minimize adverse environmental impacts (9.0)	Constructed Scale - no impact, low impact, moderate impact, severe impact
- Minimize losses of wildlife	
- minimize impact from construction	
- minimize impact from built structures	
- Minimize losses of habitat - trees and plants	
- minimize impact from construction	
- minimize impact from built structures	
2. Promote green space preservation (11.0)	Area of land alienated - physical description of the changes of the land
- Ensure safety/preservation of wildlife habitat (9.0)	
- Maximize ecological functions (11.0)	
- preserve air quality - reduce CO ₂ emissions	
- Promote recreation/physical activity	
- Provide educational opportunities	
- Maximize aesthetics - promote views/minimize monotony of landscape	
- Spiritual feeling/solitude/ well-being	
<u>Social</u>	
3. Minimize adverse impacts on surrounding residents (7.0)	Constructed Scale - best/worst
4. Equitably meet the recreational needs of the entire community (6.0)	
- maximize variability to meet needs	# of recreational activities available
- active/passive needs	# of people who can use the land
<u>Economic</u>	
5. Minimize cost to the taxpayer (1.0)	Average annual household property tax increase
- minimize cost of land acquisition	
- minimize cost of development, capital costs	
- minimize cost of operating, maintenance	
6. Maximize revenue to the city (4.0)	
- improve tax base (4.0)	Net change in annual taxes collected
<u>Municipal Land Use Planning</u>	
7. Consider the highest demand for and current availability of different land uses (5.0)	
- meet current and future needs - housing, sports facilities, parks	# dwelling units
- unload congestion from current parks	#acres parkland/1000 residents
- note the shortage of large natural parks	#acres natural areas publicly accessible
8. Maximize compatibility with the community plan (15.0)	
- plans for development, population, density	

Scale for Environmental Impacts on all Species (Rescan, 1992).

<u>Level</u>	<u>Category</u>	<u>Description</u>
1	no impact	no change
2	low impact	avoidance likely or localized effects, population effects short term, recovery likely
3	moderate impact	some lethality or chronic effects, temporary and recoverable, but localized habitat effects
4	severe impact	lethal to significant proportion of the population, permanent or large scale impacts, avoidance not possible

Scale for Impacts on Residents

<u>Level</u>	<u>Category</u>	<u>Description</u>
1	Best	Accustomed lifestyle remains unaltered; minimal negative impact from noise, traffic volume, and aesthetic changes.
2	Worst	Accustomed lifestyle is altered; significant negative impact from noise, traffic volume, and aesthetic changes.

5.5.2 The alternatives and impacts

Alternatives

Table 3 on the following page, lists the potential options that were initially decided on for the referendum. The planners helped to refine the options and ensure that they were feasible. Variations on these options may be possible. However, it is believed that this selection accounts for all distinctly different alternatives¹⁸. The options range from complete green space preservation to incremental changes in the level of development of the land. The specific details of each option are used for descriptive purposes - they help to distinguish one option from another, and they help the voter to visualize the potential uses of the land. The details could be altered once an option was chosen, and if the public so desired.

¹⁸The option to sell and develop all 100 acres is not presented since council is already in the process of designating at least 34 acres as some type of park.

Table 3 - Potential Land Use Options for 100 acres at Terra Nova

Option A - 100 acre Natural Park:

To complete the park, 49 acres of land would still need to be purchased by the City. This option would preserve the 100 acres in a natural state. The natural area and wildlife habitat would be enhanced - native trees and shrubs replanted, field habitat preserved, watercourse and drainage improved, a habitat reserve established with no trail access. Infrastructure development would be minimal - viewing platforms, observation stations, trails around and through the park connecting to the dyke, washrooms, and a parking area.

Option B - 100 acre Active Park:

To complete the park, 49 acres of land would still need to be purchased by the City. This option would change the 100 acres into a more formal, manicured landscape. There would be significant infrastructure development. The park would consist of baseball diamonds, soccer fields (potential # playing fields?), picnic/barbecue facilities, informal play areas, landscaped gardens, viewing platforms, trails connecting to the dyke, washrooms, and a parking area.

Option C - 100 acre Mixed Use Park - 50 acres Natural, 50 acres Active:

This option is a mix of options A and B. Due to the reduced amount of space for each option, some of their features would be forgone. Changes to the 50 acre natural park would include a smaller amount of field habitat retained, and a smaller habitat reserve. Changes to the 50 acre active park would include fewer playing fields and landscaped gardens, and a smaller picnic/barbecue area. The trail system would link the two parks together and connect with the dyke. One washroom facility and parking area would serve the entire site.

Option D - 51 acre Mixed Use Park (34 acres Natural, 17 acres Active) & 49 acres Residential:

This option uses only the 51 acres of land currently owned by the City; the remaining 49 acres would not be purchased by the City. The 34 acres south of Westminster Hwy would be preserved in a natural state. The natural area and wildlife habitat would be enhanced similar to option A, but on a much smaller scale. Infrastructure development would be minimal - viewing platforms, trails around the park and connecting to the dyke, washrooms, and a parking area. The 17 acres north of Westminster Hwy, would be developed into a? soccer field, baseball diamond, an informal play area and a parking area. The remaining 49 acres would eventually be developed for residential use.

Option E - 34 acre Natural Park with Zoned Activity Areas & 66 acres Residential:

This option uses only the 34 acres of land south of Westminster Hwy currently owned by the City. The 17 acres north of Westminster Hwy would be sold; the remaining 49 acres would not be purchased by the City. The 34 acres would be primarily a natural park, with certain areas (# of acres) developed for active recreation. The natural park would be enhanced and developed similar to option D, but on a slightly smaller scale. The trails would connect to the dyke and the activity areas. The activity areas would consist of sports fields, informal play areas, washrooms and a parking area. The 66 acres north of Westminster Hwy would eventually be developed for residential use.

Impacts

The preliminary list of objectives and alternatives was used to create an objectives by alternatives matrix. In developing the matrix, only objectives 1.0 through 5.0 were used as specific headings. Objectives 6.0 and 7.0 were considered in the 'Notes' section. This format helped to simplify the process without excluding important information. The previously assigned attributes were used to gain an understanding of and to describe the impacts of each option. As can be seen in the matrix (Table 4) on the following page, not all attributes were explicitly used. Because the information in the matrix is eventually used in the referendum, more descriptive easy-to-read terminology was desired. Any uncertainties associated with the potential impacts of the alternatives on the objectives were accounted for, and technical expertise from the planners helped to refine and complete the matrix. Information was also taken from the 'Terra Nova West Open Space' (City of Richmond, 1995) which provided estimates of environmental impacts, recreational opportunities and costs for different land use options for the 34 acres in the southwest quadrant. It should be noted that the funds which are already available for land purchase are derived from development cost charges (DCC's) charged for parkland acquisition in the west sector of Richmond. It is estimated that \$38.3 million is available excluding accrued interest on that account and the 11% city assist factor (SRFS, 1994).

5.5.3 The referendum and voter response

The Referendum

Information from the objectives by alternatives matrix was used to develop a referendum that explained the decision context, posed a question, and listed the options and their impacts. Appendix IV contains the final referendum. When developing the referendum, two significant changes were made to the matrix. To simplify the referendum layout, the objective 'Surrounding Residents' was excluded. Although this objective is important, the other objectives are possibly of greater importance because they focus on more comprehensive implications that affect the entire community, rather than a small portion of the population. The fifth option was also excluded. Although, it is a valid alternative, there were concerns over the amount of information that was being presented to voters. If this was an actual referendum, perhaps five options could be

Table 4 - Objective by Alternatives Matrix for Terra Nova Land Use Decision

OBJECTIVES	OPTION A 100 acre Natural Park	OPTION B 100 acre Active Park	OPTION C 100 acre Mixed use -50/50
Environmental Impacts	No negative impacts. Tree and plant habitat will increase. Wildlife populations will increase. Possible increase in wildlife diversity.	Negative impacts will be moderate to severe. Trees and plants will increase as formal plantings. Wildlife populations and habitat will decrease. Sturgeon Banks negatively impacted.	Negative impacts will be moderate. Trees and plants will increase. Wildlife populations may adapt to reduced habitat and increase, but possible conflict between sports activities and wildlife.
GreenSpace Preservation	Nearly all 100 acres will be preserved in a wild state with minimal construction, development and human intrusion. Environmentally significant field habitat is preserved.	All 100 acres will be developed into a manicured landscape. Construction and development will be moderate to high. Human intrusion will be high. Environmentally significant field habitat is lost.	Nearly 50 of the 100 acres will be preserved in a wild state with minimal construction, development, and human intrusion. The other 50 acres will be similar to option B with fewer and smaller recreational features. Human intrusion will be high.
Surrounding Residents	Current lifestyle will be basically unaltered: noise levels should not increase; traffic volume will increase slightly; park aesthetics will be wild and natural.	Current lifestyle will be altered: noise levels from sports activities will increase; traffic volume may increase significantly; park aesthetics will be manicured.	Current lifestyle will be altered: noise levels and traffic volume will increase, but not as much as option B; park aesthetics will be a mix of wild and manicured.
Recreational Opportunities	Recreation will be passive - walking, cycling wildlife viewing. Sports needs will not be met. Some areas of the park will be off limits to people, to protect wildlife and habitat.	Recreation will be passive and active - walking, cycling, <i>very limited</i> wildlife viewing, sports activities. People will have complete use of the park.	Recreation will be a mix of options A and B on a reduced scale. Fewer people will be involved in sports at one time compared to option B, but wildlife viewing opportunities should increase.
Cost	Land acquisition costs for 49 acres: \$500,000-\$600,000/acre = \$25 - \$30 million total. Funds are already available. Capital costs: about \$5million; some funding may be available. Maintenance costs: Low	Land acquisition costs for 49 acres: \$500,000-\$600,000/acre=\$25-\$30million total. Funds are already available. Capital costs: about \$10 million. Maintenance costs: High	Land acquisition costs for 49 acres: \$500,000-\$600,000/acre= \$25-\$30 million total. Funds are already available. Capital costs: about \$7.5 million; some funding may be available. Maintenance costs: Moderate - High
Notes	This park would be the second largest natural park in Richmond out of about 7.	This park would be the largest active park in Richmond out of 90.	This park would be the first park of its kind in Richmond.

Table 4 continued - Objective by Alternatives Matrix for Terra Nova Land Use Decision

	OPTION D	OPTION E
OBJECTIVES	51 acre Mixed Use Park; 34 acre Natural Park; 17 acre Active Park; 49 acres Residential	34 acre Natural Park w/ Zoned Activity Areas; 66 acres Residential
Environmental Impacts	Negative impacts will be moderate to severe. Trees and plants will increase in some areas, but will decrease in others. Wildlife populations and habitat will decrease. Sturgeon Banks negatively impacted.	Negative impacts will be moderate to severe. Changes and negative impacts will be similar to option D, but probably more severe.
GreenSpace Preservation	Nearly 34 of the 100 acres will be preserved in a wild state; 17 acres will be developed into a manicured landscape; and 49 acres will be developed for housing. Construction, development and human intrusion will be highest in the residential area.	Nearly 20 of the 100 acres will be preserved in a wild state; 14 acres will be developed into a manicured landscape; and 66 acres will be developed for housing. Construction, development and human intrusion will be highest in the residential area.
Surrounding Residents	Current lifestyle will be altered: noise will increase; traffic volume will increase significantly; park aesthetics will be a mix of wild and manicured; new housing will impact views and aesthetics.	Current lifestyle will be altered: changes will be similar to option D, but more severe.
Recreational Opportunities	Recreation will be passive and active, but not to the same extent as options A, B, or C - walking, cycling, <i>limited</i> wildlife viewing, sports activities. Fewer people will be involved in sports at one time compared to options B or C.	Recreation will be passive with some active, but not to the same extent as options A, B, C or D - walking, cycling, <i>limited</i> wildlife viewing, sports activities. Fewer people will be involved in sports at one time compared to options B, C or D.
Cost	Land acquisition costs: \$0.00 Capital costs: about \$3.5 million Maintenance costs: Low	Land acquisition costs: \$0.00 Capital costs: \$2.5 million Maintenance costs: Low - Moderate
Notes	600-900 dwelling units could be developed; additional tax base =	800-1200 dwelling units could be developed; additional tax base = Revenue generated from sale of 17 acres = \$8-10 million.

warranted, but under hypothetical circumstances where voters volunteered to participate in the 'referendum', five options might be excessive, and could result in volunteers not participating as whole heartedly.

The Vote

Complete documentation of the voting results can be found in Appendix V. Approval voting resulted in the following:

Option A, 100 acre Natural Park:	128 votes (41.56% of the vote)
Option C, 100 acre Mixed Use Park:	116 votes (37.66% of the vote)
Option D, 51 acre Mixed Use Park & Residential:	38 votes (12.34% of the vote)
Option B, 100 Active Park:	26 votes (8.44% of the vote)

From this voting sample it appears that green space is important to some Richmond residents. The voting results indicate that people are aware of the importance of green space and consider it to be of value. Their preference for it is expressed through their vote. Other values and preferences are also expressed through the ballot. Some voters felt that meeting the needs of a variety of users was important, and opted for a mixed use park. Others expressed their preference for not only mixed use of the land, but also for the least expensive alternative, option D - economic factors seemed to be an important consideration. Finally, others preferred strictly active recreational opportunities, and chose option B.

With regard to the method of approval voting certain observations can be made. 106 voters (53%) chose to select only one option. It is possible that some voters did not understand that they could select more than one option, but the chances of all 106 voters misunderstanding is unlikely. Thus, it appears that some voters had a strong preference for only one option. 55 voters selected only A; 35 voters selected only C; 13 voters selected only D; and 3 voters selected only B. The combination of options that was most preferred was A and C, with 49 votes. There were fewer combinations of other options, with C and D being the next most popular combination with 12 votes. There were only 2 voters that appeared to be indifferent about the options, choosing all 4. Attempting to interpret the reasons for why people chose the combinations they did is beyond the scope of this case study. Voters would need to be specifically asked for an explanation.

The fifth question on the feedback questionnaire is considered in this section since it is concerned with voting. The question posed was: 'If you could vote for only one option, which one would you vote for?' The plurality voting response was similar to approval voting with options being chosen in the same sequence, but option A gained 7.44% more of the vote with 98 votes (49%). Option C received 67 votes and dropped 4.16% to 33.5%. Option D obtained 21 votes, dropping 1.84% to 10.5%. Option B again received the least support with 14 votes, dropping 1.44% to 7%. With plurality voting, the most notable changes were with options A and C. When voters could choose only one option, 43 out of 72 voters who had approved A as one of the acceptable options on the official ballot, selected A as their first choice. In other words, nearly 60% of these voters preferred option A over the other options they had approved. Of those voters who chose the combination of A and C, which was the most popular combination of options and received 24.5% of the approval votes, 67.35% preferred A over C when they could vote for only one. Some of the voters even wrote on the ballot that option A was their first choice, but if this was not possible, option C would be acceptable. Based on these results, it can be concluded that nearly 50 % of the voting sample has an awareness of and preference for green space. Nearly 34% of the voters believed in a compromise of uses, and thus voted for C. Voters least preferred options B and D, which could indicate that the majority of the voter sample does not approve of development of this green space for an active sports park or for housing. Determining the reasons for the low votes for options B and D would have required asking voters for an explanation.

Feedback on the SVR

The four other feedback questions on the last page of the ballot yielded the following:

Question 1: 'How do you prefer this style of referendum that offers options to choose from compared to the conventional 'Yes/No' referendum with only option?'

The response to this question was highly favorable, with 112 respondents selecting 1 on the 7 point scale, indicating that they preferred the SVR style a lot more. 6 participants were ambivalent, scoring 4, and 10 participants seemed to prefer the SVR less. Of the 10, only 3

respondents rated the SVR as 7. The mean score for this question was 1.78, which indicates a strong preference by most voters for the SVR.

Question 2: ‘How easy to understand and use is this style of referendum which allows you to pick more than one option?’

The response to this question was again favorable. Although only 107 respondents selected 1, the mean score was 1.72, indicating a large portion of the participants found this style of referendum to be very easy to understand and use. 8 respondents were ambivalent, scoring 4, and 5 respondents indicated that they had some difficulty in understanding the referendum. Only 1 respondent found the SVR to be not at all easy to understand and use, rating it as 7. One voter who rated the SVR as 1, wrote that there were too many choices, and they should have been limited.

Question 3: ‘Was the information on the ballot useful in helping you to choose the option(s)?’

As in question 2, 107 respondents selected 1, indicating that the information was very useful. The mean score was 1.75. Thus, a high portion of the voters found the information useful. 7 people were ambivalent and provided a rating of 4. 3 respondents indicated they did not find the information useful. Only 1 participant gave a score of 7. One voter who provided a score of 3, noted that there was too much information for the general public to absorb, and that people may be less likely to respond effectively when it takes too much work to vote on the options.

Question 4: ‘How useful do you believe this style of referendum could be in terms of guiding public policy?’

This question received the poorest rating, with a mean score of 2.08. Although the majority of respondents felt the referendum could be of some use, only 89 respondents provided a score of 1. 14 participants were ambivalent, providing a score of 4. 11 people did not believe the referendum would be that useful, with 2 providing a rating of 7. Based on verbal feedback from participants, one possible reason for this lower average rating could be due to people’s skepticism about the public process in general. Some participants indicated that public response was rarely considered by politicians when decisions had to be made. One voter made a written note that ‘the referendum is as useful as the quality of the information provided, and this information must be

detailed and unbiased (or at least appear to be unbiased), and at a reading level appropriate to the audience'. Another voter wrote that in order to be useful, the wording of the referendum question must be as unbiased as possible, and that this particular referendum should be particularly scrutinized due to the amount of information it provides.

Besides the feedback from the four questions, some participants provided additional written comments. Suggestions were made with regard to how the options could be improved. One voter suggested that the provision of horse trails within the 100 acre natural park (option A) would help to reduce the congestion and conflict between other users on current dyke trails. Another voter suggested the need for a viewing tower within option A. With regard to the information provided on the consequences of each option one participant felt that the impact of the Vancouver Airport expansion on the surrounding wildlife should have been mentioned, since it may have a significant negative impact. Finally, some participants noted that they would have liked to have been advised of the outcome, and suggested that participants should have had the option to sign their name and phone number.

As mentioned in section 5.4.3, finding out more about the characteristics of the voting population would have been enlightening and probably very useful when analyzing the results. However, in order to make the referendum as realistic as possible, obtaining personal information from voters was not appropriate. It is important to note though, that during distribution of the referendum, every effort was made to take as random a sample of voters as possible. In general, the group of people who participated were variable. Although specific details were not gathered from each voter, it can be estimated that the ages of voters ranged from 18 to 70+, genders were a fairly even 50/50 mix, and ethnic backgrounds were mixed. Income and education levels could not be determined. One noticeable point with the voter sample was that the newer immigrants from Asia were reluctant to participate either because they were not comfortable communicating in English and/or they did not know Richmond well enough to take part in the referendum. As a result, the newer Asian immigrants made up a small portion of the voter sample. Despite this slight biasing of the voter sample, and despite the fact personal details were not obtained from voters, the results in their current form are still useful and can be effectively used in chapter 6 for

evaluating the SVR approach. If, however, a similar referendum was to be distributed again, providing people with an option to complete a 'voter profile' section is definitely worth considering. In addition, use of an interpreter or a multiple language ballot may encourage greater participation from new non-English speaking immigrants.

5.6 Summary

The land use decision surrounding 100 acres of vacant land at Terra Nova is a complex one that involves technical information and values. It is ideally suited for an SVR case study. By using Terra Nova as a case study, the objective of eliciting all relevant values that are important in making a land use decision was met. The structuring process and ballot enabled people to express their values and preferences. In particular, the SVR provided voters with an opportunity to express their preference for green space, and it helped clarify what type of green space was important to them. It also helped to expose people's awareness of and characterize the importance of the role of green space. Although the time spent and extent of the procedures were not as great as they would be with a real SVR, the final referendum that was developed was fairly comprehensive and realistic. The case study revealed values that were important to people in making a land use decision. They included green space values, social values and economic values. From these values, a range of options were developed and their impacts conveyed. The referendum ballot provided voters with the opportunity to express their preferences for the options, and they were not restricted to choosing just one. The final outcome revealed that option A, 100 acres of Natural Park, was the most preferred, indicating people's preference for green space. Feedback on the questionnaire showed that the majority of participants thought favorably of this style of referendum - ratings were high in terms of preference over the conventional 'yes/no' referendum, ease of understanding and use, usefulness of the ballot information and usefulness of the referendum in terms of guiding public policy. Given the results of this case study, the effectiveness, feasibility, and overall usefulness of the SVR approach in aiding land use decision-making processes can now be examined in chapter 6.

CHAPTER 6 - POLICY IMPLICATIONS AND CONCLUSION

In this final chapter, the SVR approach is evaluated for its effectiveness, feasibility and overall usefulness. The findings from the case study and the literature review are used to draw conclusions about the SVR. Policy implications specific to Terra Nova and for general purposes of making land use decisions involving green space are noted. To conclude the chapter, a brief summary of the purposes is provided, the main points of the thesis are reviewed, and closing comments are made.

6.1 Effectiveness, Feasibility and Overall Usefulness of the SVR

An evaluation of the SVR is made in specific terms that relate to Terra Nova and in more general terms. In both of the following subsections, the SVR is evaluated for its effectiveness, feasibility and overall usefulness. Suggestions are made where appropriate as to how certain aspects of the SVR can be improved.

6.1.1 Specific to Terra Nova

Effectiveness

The SVR as it relates to the Terra Nova case study is examined for its effectiveness at: comprehensively eliciting a range of values and objectives; developing options and determining their consequences; providing voters with an opportunity to express their preferences; exposing people's awareness of the role of green space and characterizing its importance; and providing an opportunity to make a comprehensive land use decision.

Even though only small discussion groups were used to elicit values and objectives, the feedback from the groups was diverse, and a fairly comprehensive set of objectives that depicted what mattered to people when making a land use decision was obtained. The SVR structuring process, which occurred in a relaxed atmosphere and was not too cognitively demanding, effectively exposed a range of values. In particular green space values had the chance to be expressed and incorporated into the option development process. The resulting set of structured objectives was extremely useful in creating options which accounted for the different needs and concerns of the voters.

Improvements could, however, be made to both the objectives and the options structuring processes, which could lead to an even more accurate representation of what matters to people when making a land use decision. The size of the discussion groups could be increased, and a greater diversity of stakeholders represented. Within the objectives structuring process, the depth of analysis could occur over a longer time period and be more extensive - techniques to rank and weight objectives, like SMART, could be used to establish any preliminary tradeoffs. When considering the impacts of the options, the uncertainties associated with the technical information could undergo analysis. These adjustments would give decision-makers and referendum designers greater insight into what should be stressed when developing the question, options and consequences. Despite the limitations found with the development process, the size of the groups that were involved was large enough and diverse enough to lend plausibility to the results.

The voting stage of the SVR easily and effectively allowed people to express their preferences for the options. The votes people cast exposed what they thought was important in making a land use decision. The votes also indirectly revealed how the participants valued green space. The results suggest that green space is important to people, with a majority of the 200 voters preferring the preservation of green space. The approval voting rule that was used made the expression of preferences even easier; the voting task was cognitively simple and people were not restricted to just choosing one option. Although preference intensity is not as effectively measured as with other techniques like MAUT and the CVM, one way to improve the understanding of *how much* voters prefer an option is to have them rank their votes in approval voting. Some voters willingly did this in the case study, and others mentioned that they would have preferred if a request for ranking was made on the ballot.

An even more accurate representation of voters preferences may have been obtained in this case study if the objectives were not limited, the consequences were more thorough, and the fifth option was presented. The fact that certain amounts of information were omitted may be considered to be a weakness of the study, but a compromise had to be made between providing voters with enough information and not overwhelming them with too much information.

With regard to exposing people's awareness of the role of green space and characterizing its importance, the SVR was effective in an indirect manner. Surveys geared to specifically asking people about their awareness of green space's role in the urban environment may be a more direct method. Nevertheless, through both the structuring process and the vote, people expressed their awareness, and the voting results ultimately characterized green space's importance.

A final factor that could improve the overall effectiveness of this SVR is an information program. Implementation of a program would help reduce the amount of information that was presented on the ballot. (Too much information on the case study ballot was a concern for some participants.) If an information program was established beforehand, information overload can be avoided. An information program would also be useful in that it could be presented in multiple languages, thereby reaching a potentially wider voting population and minimizing the difficulties of voter biasing. The effectiveness of the SVR would be enhanced with a wider cross section of the voting population participating and expressing their preferences. It should be noted that the effectiveness of the program in helping voters to understand the decision problem depends on how effectively and comprehensively the benefits and costs of the options are conveyed.

Despite the limitations of the SVR in this case study, it can be concluded from the results that this values elicitation approach provides an effective means of expressing values and offers extensive opportunity for public involvement. As a result, this SVR effectively offers an opportunity for the development of a comprehensive land use decision at Terra Nova that accounts for the value of green space.

Feasibility

The feasibility of the SVR approach is an important consideration. Questions need to be raised with regard to how realistic it would be for public officials to implement this tool for the Terra Nova decision problem. This is not as clear cut a situation as the CRD sewage treatment referendum where public officials recognized the need for comprehensive public input and decided to use an SVR. In the case of Terra Nova, factors such as the political climate, the degree of importance public officials assign to the issue, the amount of public feedback desired, and the amount of time, money, level of expertise and knowledge that would be required to execute an

SVR must be given serious consideration. In addition, possible legal difficulties must be considered with regard to holding an SVR that affects land that is still privately owned. If a decision was made to use an SVR, this approach would be feasible in terms of cost, time and expertise required. The technique is flexible enough that it can suit different time and cost requirements and be adapted for purposes ranging from a survey to a universal binding vote. The decision problem, although relatively complex, is manageable. Technical and values information could be arranged in a format that is readily understood by the general public. A significant amount of time and money will be necessary to make the referendum as useful as possible, but any technique that effectively elicits values and aids in the decision-making process consumes time and money. The end result makes the effort worthwhile.

Usefulness

Given the favorable assessment of the SVR's effectiveness and feasibility, it can be concluded that the SVR technique is a useful and appropriate tool for the Terra Nova land use decision problem. In this case study, the SVR approach helped organize a complex situation so that a decision was structured, the many values surrounding the issue were revealed and organized¹⁹, options reflecting the values were created, consequences were acknowledged, and the general public was able to express their preferences for the options. The results from the feedback questionnaire show that this SVR was essentially preferred to the conventional 'Yes/No' referendum. Most people found it easy to understand and use, and they felt the information helped them to choose the option(s). Although there was some skepticism with regard to the SVR's usefulness in guiding public policy it was considered to be of some use.

Based on the success of the SVR in the case study, a full scale SVR would undoubtedly be of use. Implementation of an SVR could help Richmond planners and council to address the questions of how much land to buy and what to do with it. The flexibility of this tool would enable public officials to approach the situation in various ways. Different questions from the one posed in the case study could be asked. If officials did not want to carry out a full scale universal binding vote, the SVR would still be useful; the referendum could serve as a poll. Even though the

¹⁹In particular, the SVR allowed for green space values, which are prevalent in the Terra Nova situation, to be accounted for.

impact would not be as great and there would be the possibility of the voters not working as hard, the officials would minimize expenses and possible controversy, and still gain an understanding of the concerns and preferences of a large number of people.

If the City of Richmond did implement an SVR for Terra Nova, the results could be invaluable in aiding the land use decision making process. A comprehensive decision could be reached that may aid in the preservation of green space. It is important to note that the usefulness of the results may be influenced by the politics of who controls the referendum design. Biasing of any information can lead to biasing of results. In addition, who votes influences the results. Efforts should be made to reach as wide a cross section of residents as possible. Ultimately the usefulness of an SVR for Terra Nova will depend on how the results are used; whether they are binding or advisory impacts the final decision significantly.

Even if Richmond public officials did not implement a real SVR, they can still use the results that were obtained from this case study. These results can be used to promote further thought and discussion by various groups about appropriate value tradeoffs for green space preservation at Terra Nova, and perhaps green space values in general. The results can also help to set priorities for further collection and analysis of data for Terra Nova green space preservation. Finally, they can be used to characterize the range of preliminary viewpoints regarding tradeoffs for land use and green space preservation.

The decisions surrounding the Terra Nova case reflect the larger issue of sustainable development. The citizens and council of Richmond have an excellent opportunity to work together to try to create a balanced ecologically sensitive community. Implementation of an SVR or even use of the case study results could help the citizens work towards a more sustainable community.

6.1.2 For general purposes of making land use decisions involving green space

Effectiveness

Both the literature review and the case study provide enough information to indicate that the SVR approach can be an effective tool in aiding land use decisions involving green space. This approach effectively provides a forum through which individuals can discover what value green

space provides for themselves and for other people. It also allows for the elicitation of a comprehensive range of values and objectives, the creation of options and consideration of their consequences. In addition, an SVR allows for effective public participation and provides voters with an opportunity to express their preferences. It is important to note, that in order for an SVR to be most effective, an assumption must be made that voters are or will become sufficiently involved, interested, and informed to pass judgment on the policy issue.

To improve the effectiveness of this approach some suggestions are made. When structuring the referendum, such organizers as decision trees and influence diagrams can be used to more clearly convey information, relations and/or probabilities. The information program that is developed before the actual vote should clearly represent the decision context, the options and the costs and benefits of their consequences in as neutral a manner as possible. This way the voters can develop a clear overall picture of the decision context and the choices available. Any uncertainties surrounding the consequences of the options should be explicitly accounted for in the program. On the ballot, there must be sufficient guiding information and cues to voters to aid in understanding of the decision context and in making tradeoffs among alternatives. The amount of information on the ballot should be minimal to reduce the possibility of confusing voters and to encourage their full participation in the vote. The information program should provide the largest volume of information, since people may be more inclined to absorb and understand information if it is presented over an extended period of time.

Feasibility

The issues of time, cost, and the level of expertise and knowledge required must be taken into account when considering the overall feasibility of the SVR approach for land use decisions. As was noted earlier, a significant amount of time and money is likely to be needed to conduct workshops, consult with experts, design the referendum and develop an information program. This may be a deterrent to using it. However, all worthwhile valuation techniques are costly. The end result is likely to be an effective comprehensive decision with a majority of satisfied citizens. One possible way to reduce the overall cost is to combine the SVR with another vote.

With regard to the level of expertise and knowledge required to develop and implement an SVR, it can be high. Structuring the objectives and alternatives can be complicated and cognitively difficult. Thinking about preferences, tradeoffs, uncertainties and probabilities is not easy, and requires deep thought. Too much learning may alienate participants, and they may be inclined not to participate fully. However, this tool is flexible in that it does not rely as heavily (as MAUT, for example) on weighting attributes and explicitly conveying probabilities, although it does provide opportunities to do so, when desired or necessary. Methods such as value trees and SMART can be used to help reduce the complexity of the structuring process.

When the options are being created, the analyst must take the time to simplify the often technically difficult information so that it is understandable to the general public. Value judgments and tradeoffs must be made during this structuring process. Although, the analyst does not want to provide too little information and risk losing comprehensiveness, s/he also does not want to overload the voters with information which could lead to confusion and misunderstanding of the issue. When information is presented on the ballot, tradeoffs are inevitably made with respect to the amount of information, the degree of comprehensiveness and the level of understandability.

Even with these drawbacks, the overall process of the SVR approach can be considered to be feasible. Values can be systematically elicited from non-experts and combined with factual input from experts; in particular, green space values which are largely ignored in many land use decisions are acknowledged and incorporated with the SVR method.

Usefulness

It has been demonstrated that the SVR is an effective and feasible means of eliciting values and aiding in the development of comprehensive land use decisions that involve green space. Its overall usefulness is now considered. Like any tool, the SVR's usefulness is restricted to certain decision contexts. Section 4.2.1 outlines the criteria necessary to use an SVR effectively. With regard to land use and green space preservation decisions, the application of an SVR is limited to certain situations. All land use decisions that relate to green space preservation and development conflicts will not be suited to an SVR. It is only useful if government can be involved in the land use decision and public officials are genuinely interested in conducting a comprehensive,

participatory planning process. In addition, the land must have a predisposition for being preserved as green space. In other words, if the land is already appropriately zoned for development, an SVR may not be the right tool to use to try to save the green space. Other preservation methods may be more appropriate and effective.

If an SVR is appropriate, the approach can provide decision makers and policy makers with very useful information. The structuring process clarifies objectives that are relevant to the decision at hand and it can lead to the development of feasible alternatives. The voting process elicits preferences from a large number of concerned citizens (significantly more than with other values elicitation techniques) and allows them to make informed tradeoffs. The information obtained from all stages of the SVR helps the political decision maker in choosing the best option or policy.

The flexibility and adaptivity of the SVR to the needs of the decision context and the participants further adds to its usefulness. It can be conducted in the form of a survey or partial poll, or as a binding vote. Because this approach is based on decision analysis and value focused thinking, it does not even have to be used in its entirety. The structuring of objectives may be sufficient for certain situations. However, not using the SVR fully, does limit its effectiveness and full impact.

It is important to keep in mind that the usefulness of the SVR and the subsequent results are dependent on the type and amount of information supplied. How the value structuring process is conducted, how the context information, options and consequences are displayed and how the question is posed all influence the usefulness of the results. The usefulness of the SVR may also be limited by the possibility of being biased by politics. However, since the objective of an SVR is to obtain informed judgments about public preferences, it is to the advantage of the political decision makers to make the information and wording of the SVR as neutral as possible. Finally, the usefulness of the results also depends on voter turnout. The more people who participate, the more complete an understanding of how people really feel about the issue is gained. Combining the SVR with another vote may help to encourage voter turnout. In addition,

the situation itself and how strongly people feel about it will have an influence on voter participation levels.

It is recognized that the SVR is not as flexible a tool for policy analysis as the CVM or MAUT since it is fixed on the specific issue it was designed for, and the structure can not be manipulated to observe any variations in preferences. However, the SVR is still a valuable communication facilitator that can aid decision makers in making the most effective decision possible. As more and more people expect to have a role in decision-making processes and as issues become increasingly more complex, so must the range of tools for making decisions. The SVR approach provides a means for direct values expression and political participation, and it gives citizens a voice on questions of public policy.

6.2 Conclusion

6.2.1 Summary of the contents

This thesis explored two areas - the value of green space and a method that can regulate people's values so that they contribute to land use decisions. To effectively explore these areas, a threefold purpose was developed. The purpose of this thesis was to: (1) understand the importance of green space; (2) understand the importance of the use of values in the decision-making process; and (3) employ the structured value referendum and evaluate its ability to elicit values in a land use decision-making process. A literature review, case study and consultation with planners helped to meet these purposes.

In the literature review the problem context of green space loss was first examined, and the complexity of the issue was revealed. A general concept of value was then developed, which laid the foundation for the construction of a green space values taxonomy. This taxonomy contains economic, social, ecological and sustainability values. It is believed that this taxonomy can help to advance an understanding of the values originating from green space, and it can help inform the allocation decision-making process by providing a common information source for all stakeholders. Clearer communication is facilitated, participation is more informed and value tradeoffs and options evaluation can occur.

The literature review then provided a rationale for clarifying and using values. It was shown that values are an important part of making tradeoffs and decisions. Making these values explicit can help form better decisions. By setting priorities, recognizing tradeoffs will occur, and gaining a better understanding of the complexity of the situation, more comprehensive and effective land use policies can be developed. The problem with lack of values incorporation in decisions involving green space was discussed next, and values elicitation techniques that can account for green space values (travel cost method, hedonic price method, CVM and MAUT) were briefly presented and evaluated.

The structured value referendum, was then discussed and analyzed. Through the literature review, it was shown that an SVR provides a decision structure where voters assimilate technical information and make choices among several well-defined alternatives, given information on the benefits and costs of each. This approach provides an opportunity for green space values to be recognized and used in a land use decision-making process. The SVR can ultimately help to set priorities for the planning, development and management of green space. To test the SVR approach, it was used in a case study. The technique was found to be useful in aiding a land use decision making process for Terra Nova. It helped to clarify values, it allowed people to make informed tradeoffs and decisions, and it could aid public bodies in making a final decision over whether or not to preserve the Terra Nova green space. The SVR structuring process and the referendum helped to clarify people's awareness of the role of green space and characterize its importance. Although the SVR is not without weaknesses as was revealed through the literature review and case study, in general it can be considered to be an effective tool for eliciting values, making tradeoffs, and aiding in the development of comprehensive land use decisions that could result in the preservation of green space.

6.2.2 Concluding Remarks

Through the development of this thesis it has been shown that green space is valuable and there are ways to effectively elicit and use all values to make informed land use decisions. While the past role of green space in contributing to the quality of life and environment in urban areas is clear, its future role is not. The survival of green spaces is at stake in an era of scarce resources,

an ever expanding population and competing needs for public support. If we are ever to rectify the environmental problems we have created and reach a sustainable state of living, we must employ creative rather than destructive skills. The act of preserving green space reflects a creative skill, for it enhances the quality and value of the built environment. The SVR approach is one tool that can be used to achieve greater preservation of green space, and ultimately improve our environment. However, reliance on this tool alone is not feasible. Other tools are needed to structure, convey and incorporate green space values in land use decisions. These tools include education, legal and policy restrictions, economic incentives, and outright purchase and preservation of green space by public and private bodies, before development becomes an issue. The Federation of B.C. Naturalists (1992) provides an extensive discussion on the different preservation tools that can be used.

Green space preservation in the urban environment may seem trivial in light of larger problems occurring on a global scale, but when the values associated with green space are understood, the implication of ignoring them are huge, since all small decisions influence whether or not our society will achieve sustainability. Green space preservation and the ultimate improvement in our quality of living will depend on the coordinated efforts of policy makers in public agencies and private corporations, planning and design professionals, scientists and citizens. Each community must learn to appreciate the values inherent in green spaces and understand that urban form and human development can evolve in concert with nature.

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Appendix I - Information given to participants

AGENDA

(for June 16 & 17 sessions)

1. Outline the purpose of my thesis.
2. Outline the purpose of this session.
3. Part I - Discuss green space values in general (15 minutes).
4. Part II - Provide background on the Terra Nova Case Study and discuss (40 minutes).
5. Wrap up - discuss the final referendum product and request participants' feedback (in a few weeks) on how easily the question, options and impacts are understood.

The approximate time for this session is *1 hour*



Purpose of My Thesis:

- To gain an understanding about the importance of green space.
- To gain an understanding about the importance of clarifying and using values in decision-making processes.
- To use a technique called the 'structured value referendum' to elicit values (including green space values) that are important in making land use decisions. This technique will help me to understand people's awareness of and characterize the importance of the role of green space in the urban environment.

Purpose of this Session:

- Essentially it is just to help me collect information for my thesis. This is simply a discussion that consists of two parts.
- Part I consists of about 15 minutes where I want you to talk about green space in general. This part of the session serves as a **warm up** to Part II.
- Part II consists of about 40 minutes where I want you to talk about values that you feel are important in making a specific land use decision for 100 acres of undeveloped land at Terra Nova.
- The results I obtain from you will help me develop land use alternatives and assess the impacts of the alternatives on the values. Your values ultimately help to develop a referendum that asks people to choose the best land use option for Terra Nova.

Why even bother talking about values?

Values people hold are fundamental to making decisions. It is believed that the more comprehensive the set of values that are used, the more effective the decision that will be made. It's important to keep in mind that the value aspects of the problem at hand are very complex and it is extremely difficult to express all these values consistently when one is doing this informally. So I will be identifying any inconsistencies and asking you questions that seem redundant to eliminate redundancy in the objs. **Remember: There are no right or wrong answers and no consensus is required among the group.** My main concern is to get a fairly comprehensive list of a set of values or objectives that you think are important with regard to green space in general and the Terra Nova land use decision.

Agenda

(for July 17 session)

1. Outline the purpose of my thesis and this session.
2. Briefly discuss proceedings from last two focus groups.
3. Present structured objectives and attributes and make any further additions.
4. Present options and 'objectives by alternatives' matrix and discuss:
 - feasibility of options, missing information, any necessary changes
5. Wrap up - present the preliminary SVR for feedback.

The approximate time for this session is *1 hour*

Purpose of My Thesis:

1. To gain an understanding about the importance of green space.
2. To gain an understanding about the importance of clarifying and using values in decision-making processes.
3. To use a technique called the 'structured value referendum' to elicit values that are important in making land use decisions. This technique will help me to understand people's awareness of the role of green space in the urban environment.

Purpose of this Session:

To help me collect information for my thesis - this is simply a discussion that consists of 2 parts:

1. First, I'd like to talk briefly about the list of objectives and attributes (Table 2) I developed from my previous group sessions, and obtain your feedback on any other major objectives that you feel are important in making a land use decision for 100 acres at Terra Nova. We'll spend about 10 minutes maximum on this part.
2. Next, I'd like to take about 40 minutes to discuss the alternatives and impacts I developed based on the objectives and attributes. An attempt was made to develop alternatives that meet the concerns of voters, are feasible, and are distinct enough to provide tradeoffs among key objectives. I'd like your feedback on the feasibility of the options, and the accuracy of the impacts. I also need further information on certain aspects of the options and impacts.

PART I - GREEN SPACE VALUES

A Definition of Green Space

Green space is generally any area that is predominantly undeveloped and is found within an urban environment. It is comprised of natural or semi-natural areas. Green space may be comprised of trees and shrubs that are sparse or in great abundance. It may or may not be carefully arranged and maintained. Green space encompasses urban forests, wetlands and marsh areas, bogs, shorelines, rural space and overgrown farmland. Sites can also include urban and regional parks, school playing fields, natural reserves, and vacant unprotected wild enclaves. This term is intended to be broad and inclusive.

A Question to get you started:

In the next 15 minutes you will discuss what you think is important about green space in general. Here is the question I'd like you to address:

‘What role does green space play in Richmond? ‘How do you use this green space?’

If this question doesn't make sense to you, below is a list of similar questions which should help you to think about green space:

1. What services or benefits does green space offer?
2. What do you think is important about having green space in Richmond?
3. Why do you think green space should be preserved?

PART II - TERRA NOVA GREEN SPACE

Background:

Terra Nova is comprised of 340 acres of which 240 acres have been developed into single family and townhouse units. The remaining 100 acres are still agriculturally zoned and have the potential to remain as green space. The city owns approximately 51 of the 100 acres. 34 acres are located in the southwest quadrant of Terra Nova. Richmond's city council is considering acquiring land from the remaining 66 acres which are still privately owned in Terra Nova's northwest quadrant. The city currently owns 17 of the 66 acres. The entire purchasing process will take place over a number of years. With the purchase of this land, council must decide on the land's most suitable use. Council has indicated that their intention is to use the land to create a park. Although public officials have mentioned that public meetings are likely to be required before a park plan can be developed, none have taken place yet. Since this land is supposed to be for the use of the public, concerned citizens must be able to express their values and have input. The researcher would like to use the SVR approach on this case study; this approach could help to clearly define the policy decision, elicit values from the public, examine the alternatives, determine the impacts and make an effective land use decision. To summarize, the decision that the referendum will focus on is: 'What is the best use of 100 acres of undeveloped land (green space) at Terra Nova?

A Question to get you started:

In the next 40 minutes you will discuss what you think is important in making this land use decision. Here is the question I'd like you to address:

'What should be considered when deciding what to do with the 100 acres of green space at Terra Nova? Discuss and articulate.'

Please take 10 minutes to write down what you think the key points or objectives should be. We will then go around the room and make a common list of points/objectives - we will draw from each person's list, discussing the meaning and why it is important, so as to further refine the objectives. If this question doesn't make sense to you, below is a list of similar questions which should encourage discussion on what you feel is most important when deciding on the best use of the Terra Nova green space:

- 1.) What *concerns* do you have with regard to the use of TN green space? Why?
- 2.) What do you *value* with respect to the *type* of green space that should exist at TN? Why?
- 3.) What are the *benefits & costs* associated with the preservation of TN? Why?
- 4.) What matters in making a public decision about how the remaining 100 acres of TN are used? Why?

Appendix II - Green Space Values

Following are the responses from the group discussions that took place June 16 and 17. The information has been slightly adjusted to fit under certain categories, but it is essentially documented the way it was expressed in the discussion.

Group 1 Responses - to 'What role does green space play?'

1. Recreational activity:
 - Sports
 - Passive recreation
2. Psychological benefits:
 - Peace of mind, stress reliever
 - Solitude, removal from people
3. Social interaction:
 - Children's play space
 - Family gatherings, picnics
 - Meets the needs of a variety of people
4. Educational value
5. Provides wildlife habitat
6. Bequest values - important for future generations to have
7. Existence values - natural heritage
8. Property value - parks adjacent to residential areas enhance value
9. Aesthetic value - important to have views

Group 2 Responses - to 'What role does green space play?'

1. Leisure activities/Exercise:
 - Cycling, walking, sports
2. Psychological benefits:
 - Stress reliever, break from work, peacefulness
 - Solitude, removal from people
 - A feeling of being in open space, removal from urban environment
3. Environmental benefits:
 - Pollution cleanser
4. Aesthetic value:
 - Wildflowers
5. Provides wildlife habitat - balances ecology
6. Educational value - removes children from an urbanized area

Appendix III - Focus Group Objectives

Following are all the responses from the group discussions that took place June 16 and 17. Similar sets of words have been combined and objectives have been reorganized, but essentially what is documented is what was expressed in the discussions.

Group 1 and 2 responses - to 'What should be considered when deciding what to do with the 100 acres of green space at Terra Nova?'

- 1.0 Minimize cost to the taxpayer
 - minimize cost of land acquisition
 - minimize development, capital costs
 - minimize operating, maintenance costs
- 2.0 Consider source and availability of funds
- 3.0 Offer fair purchase price to current owners of privately held parcels
- 4.0 Maximize revenue to the city
 - decrease tax bill/improve tax base
 - use money to build parks throughout Richmond
- 5.0 Consider the highest demand for and current availability of different land uses
 - meet current and future demand - housing, sports facility, park, playing fields
 - unload congestion from current land uses (from parks)
 - note the shortage of large natural parks
- 6.0 Equitably meet the needs of the existing community
 - in the northwest corner of Richmond
 - all of Richmond
 - everyone should benefit, not just a small segment of the population
 - provide variability to meet needs
 - active and passive needs (not enough passive recreational opportunities)
 - consider the need for social interaction
- 7.0 Minimize impacts on established nearby residents
 - traffic
 - noise
 - crime and vandalism
 - real estate property values
- 8.0 Maximize the aesthetics
 - maintain the current aesthetic value
 - maintain views
 - provide variability to break monotony

Focus Group Objectives cont'd

- 9.0 Minimize impacts on wildlife and habitat
 - ensure a safe habitat
 - preserve habitat for wildlife
 - consider the migratory path significance
 - consider the compatibility of the use with wildlife
 - keep people out of part of the area
- 10.0 Consider the ecological significance of the area
 - know the implications of the overall effect on wildlife and habitat
 - will the option benefit/harm the wildlife and habitat significantly?
- 11.0 Promote green space preservation
 - recreation, exercise
 - aesthetics
 - spiritual feeling/well-being
 - solitude/removal from an urban environment/feeling of openness
 - wildlife and habitat
 - promote ecological functions - decrease CO₂ emissions
- 12.0 Consider accessibility
 - maximize the use of bikes and pedestrians
 - minimize the need for the car - air pollution and parking concerns
- 13.0 Maximize the practicality and feasibility of the alternative
 - option must be compatible with existing surroundings
 - option should compliment existing dyke system and recreational use
 - easily accessed
- 14.0 Consider public opinion
 - a fair public process where citizens' concerns are acknowledged and incorporated
- 15.0 Must be compatible with the community plan
 - plans for development, population, density
 - minimize overpopulation

Appendix IV - Land Use Referendum for Terra Nova

LAND USE REFERENDUM for TERRA NOVA

This referendum-style questionnaire is part of a study being conducted at the University of B.C. Its purpose is to help researchers understand what matters to people when making a land use decision. Vacant land at Terra Nova is used as a case study since it will be subject to land use decisions in the future. Please read through this page before voting. *Although this is not an official referendum, please answer the question as if you were 'voting' in a real referendum on the issue.* The results will be made available to Richmond council and planners, and could be considered in future land use decisions for Terra Nova.

EXPLANATION:

Terra Nova consists of 340 acres, of which 240 acres have been developed for residential use. 100 acres are still agriculturally zoned and have the potential to be retained as green space. Currently, the city owns about 51 of the 100 acres. The remaining 49 acres are still privately owned, but Richmond's city council approved a plan to acquire this land. If acquisition proceeds, council must decide on the land's most suitable use. It is known that at least 34 acres will be used as a park, and council will be requesting public input on the type of park desired. As for the remaining 66 acres, no request has been made for public feedback. Since a land use decision for the entire 100 acres will affect the public, citizens should be able to have input on what they feel its best use would be. This referendum provides an opportunity for input.

QUESTION:

What land use option do you prefer for the 100 acres of vacant land at Terra Nova?

Four feasible options have been developed for this referendum. These options involve tradeoffs between green space preservation and development. Preservation could benefit people and the environment, and help reduce Richmond's parkland deficit of 363 acres. This deficit is based on council's goal to have 6.5 acres of parkland per 1000 residents. However, preservation would mean that opportunities to develop the land and accommodate other uses, such as housing, are foregone.

VOTING INSTRUCTIONS:

1. Read the 4 possible options.
2. Consider the different consequences of each option.
3. Vote for 1 or more options by checking the appropriate box(es). *You do not have to choose just 1 option. Please vote for as many options as you feel are acceptable to you.*

POTENTIAL LAND USE OPTIONS FOR 100 ACRES AT TERRA NOVA

Option A - 100 acre Natural Park:

To complete the park, 49 acres would still need to be purchased by the City.

This option would preserve the 100 acres in a natural state. The natural area and wildlife habitat would be enhanced. Native trees and shrubs would be re-planted, field habitat retained, watercourses improved, and a habitat reserve established. Development would be minimal with earth piles (berms) around environmentally sensitive areas, viewing platforms, trails around the park connecting to the dyke, washrooms, and a parking area.

Option B - 100 acre Active Park:

To complete the park, 49 acres would still need to be purchased by the City.

This option would change the 100 acres into a more formal, manicured landscape. There would be significant development. The park would consist of baseball diamonds, soccer and hockey fields (there is potential for 20-30 different playing fields), picnic facilities, informal play areas, landscaped gardens, viewing platforms, trails connecting to the dyke, washrooms, and a parking area.

Option C - 100 acre Mixed Use Park - 50 ac. Natural, 50 ac. Active:

This option is a mix of options A and B. Changes to the 50 acre natural park would include less field habitat retained, and a smaller habitat reserve. Changes to the 50 acre active park would include fewer playing fields and landscaped gardens, and a smaller picnic area. The trail system would link the two parks together and connect with the dyke. Washrooms and a parking area would serve the entire site.

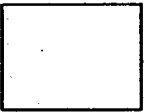
Option D - 51 acre Mixed Use Park (34 ac. Natural, 17 ac. Active) & 49 acres Residential:

This option uses only the 51 acres currently owned by the City; the remaining 49 acres would not be purchased by the City. The 34 acres south of Westminster Hwy would be preserved in a natural state. The natural area and wildlife habitat would be enhanced similar to option A, but on a much smaller scale. Development would be minimal with viewing platforms, trails around the park and connecting to the dyke, washrooms, and a parking area. The 17 acres north of Westminster Hwy, would be developed into soccer fields, baseball diamonds, an informal play area and a parking area. The remaining 49 acres would eventually be developed for residential use.

QUESTION: WHAT LAND USE OPTION DO YOU PREFER FOR THE 100 ACRES OF VACANT LAND AT TERRA NOVA?

Vote for as many options as you find acceptable.

YOUR VOTE:	OPTIONS:	CONSEQUENCES:
<input type="checkbox"/>	A. 100 acre Natural Park	<p>Environmental Impacts: No negative impacts. Wildlife populations and tree and plant habitat will increase. Possible increase in wildlife diversity.</p> <p>GreenSpace Preservation: Nearly all 100 acres will be preserved in a wild state with minimal construction and development. Environmentally significant field habitat will be preserved.</p> <p>Recreational Opportunities: Recreation will be passive - walking, cycling, wildlife viewing. Sports fields will not be built. Some areas will be off limits to people to protect wildlife and habitat.</p> <p>Cost: Land purchase costs: \$25-30 million - funds already set aside. No tax increase. Capital costs: about \$5 million. Possible tax increase \$4-5/ home owner for 10 years. Maintenance costs: Low.</p> <p>Notes: This park would be the second largest natural park in Richmond out of about 7.</p>
<input type="checkbox"/>	B. 100 acre Active Park	<p>Environmental Impacts: Negative impacts will be substantial. Formal plantings of trees and plants will increase, but wildlife populations and habitat will decrease.</p> <p>GreenSpace Preservation: All 100 acres will be developed into a manicured landscape. Construction and changes to the land will be high. Environmentally significant field habitat will be lost.</p> <p>Recreational Opportunities: Recreation will be passive and active - walking, cycling, very limited wildlife viewing, sports activities. People will have complete use of the park.</p> <p>Cost: Land purchase costs: \$25-30 million - funds already set aside. No tax increase. Capital costs: about \$10 million. Possible tax increase \$10-12/home owner for 10 years. Maintenance costs: High.</p> <p>Notes: This park would be the largest active park in Richmond out of about 90.</p>
<input type="checkbox"/>	C. 100 acre Mixed Use Park	<p>Environmental Impacts: Negative impacts will be moderate. Trees and plants will increase. Wildlife species may adapt to reduced habitat. Possible conflict between sports activities and wildlife.</p> <p>GreenSpace Preservation: Nearly 50 acres will be preserved in a wild state with minimal construction and development. The other 50 acres will be like option B, but with fewer and smaller recreational features.</p> <p>Recreational Opportunities: Recreation will be a mix of options A and B on a reduced scale. Fewer people than in option B will be involved in sports at one time, but wildlife viewing will improve.</p> <p>Cost: Land purchase costs: \$25-30 million; funds already set aside. No tax increase. Capital costs: about \$7.5 million. Possible tax increase \$7-8/ home owner for 10 years. Maintenance costs: Moderate to High.</p> <p>Notes: This park would be the first park of its kind in Richmond.</p>

	<p>D. 51 acre Mixed Use Park & 49 acres Residential</p>	<p>Environmental Impacts:</p> <p>Negative impacts will be substantial. Trees and plants will increase in some areas, but will decrease in others. Wildlife populations and habitat will decrease.</p> <p>GreenSpace Preservation:</p> <p>Nearly 34 of the 100 acres will be preserved in a wild state; 17 acres will be developed into a manicured landscape; and 49 acres will be developed for housing. Construction and development will be highest in the residential area.</p> <p>Recreational Opportunities:</p> <p>Recreation will be passive and active, but not to the same extent as options A,B or C - walking, cycling, limited wildlife viewing, sports activities. Fewer people will be involved in sports at one time compared to options B or C.</p> <p>Cost:</p> <p>Land purchase costs: \$0.00 Capital costs: about \$3.5 million. Possible tax increase \$3-4/ home owner for 10 years. Maintenance: Low.</p> <p>Notes:</p> <p>600-900 dwelling units could be developed and \$400-500,000 per year generated in extra property taxes.</p>
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Feedback on the Referendum

Your feedback on this referendum would be appreciated. Please answer the following 5 questions by circling the most appropriate number.

- How do you prefer this style of referendum that offers options to choose from compared to the conventional 'Yes/No' referendum with one option?

A lot More A lot Less



- How easy to understand and use is this style of referendum which allows you to pick more than one option?

1 2 3 4 5 6 7
Extremely Easy Not at all Easy



- Was the information on the ballot useful in helping you to choose the option(s)?

1 2 3 4 5 6 7
Extremely Useful Not at all Useful



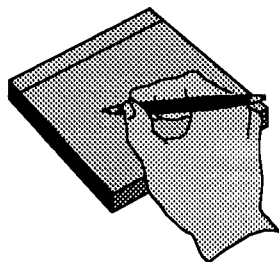
- How useful do you believe this style of referendum could be in terms of guiding public policy?

1 2 3 4 5 6 7
Extremely Useful Not at all Useful



- If you could vote for only one option, which one would you vote for?

Option A Option B Option C Option D



University of British Columbia - School of Community and Regional Planning

I agree to participate in this study titled 'Land Use Referendum for Terra Nova' that is being conducting by researchers at the University of British Columbia. I acknowledge that my participation is voluntary and I can stop participating in this study at any time. I also acknowledge that I received \$2.00 for my full participation.

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Appendix V - Referendum Voting Results

APPROVAL VOTING BALLOT RESULTS

Alphabetical Order

Numerical
Order

OPTION(S)	# of Votes	OPTION(S)	# of Votes	% of Total Vote
A only	55	A only	55	27.50%
B only	3	A & C	49	24.50%
C only	35	C only	35	17.50%
D only	13	D only	13	6.50%
A & B	7	C & D	12	6.00%
A & C	49	B & C	10	5.00%
A & D	6	A & B	7	3.50%
B & C	10	A & D	6	3.00%
C & D	12	A, C & D	4	2.00%
A, B & C	3	B only	3	1.50%
A, B & D	1	A, B & C	3	1.50%
A, C & D	4	A, B, C & D	2	1.00%
A, B, C & D	2	A, B & D	1	0.50%
Total # of Votes	200	Total # of Votes	200	
Total # of Votes With 1 option	106			
Total # of Votes w/ more than 1 option	94			

of Votes per Option

OPTION	# of Votes	% of Total Vote
A	128	41.56%
B	26	8.44%
C	116	37.66%
D	38	12.34%
Total # of Votes	308	100.00%

FEEDBACK VOTING RESULTS - ONLY ONE OPTION CHOSEN

OPTION	# OF VOTES				TOTAL # PER CATEGORY	% A	% B	% C	% D
	A	B	C	D					
From A	55	0	0	0	55	100%	-	-	-
From B	0	3	0	0	3	-	100%	-	-
From C	0	0	35	0	35	-	-	100%	-
From D	0	0	0	13	13	-	-	-	100%
From A & B	3	4	0	0	7	43%	57%	-	-
From A & C	33	0	16	0	49	67.35%	-	32.65%	-
From A & D	3	0	0	3	6	50%	-	-	50%
From B & C	0	5	5	0	10	-	50%	50%	-
From C & D	0	0	7	5	12	-	-	58.33%	41.67%
From A, B & C	1	1	1	0	3	33.33%	33.33%	33.33%	-
From A, C & D	3	0	1	0	4	75%	-	25%	-
From A, B & D	0	1	0	0	1	-	100%	-	-
A, B, C & D	0	0	2	0	2	-	-	100%	-
Total for each option	98	14	67	21					
Total # of votes	200	200	200	200					
% of Total Vote	49.00%	7.00%	33.50%	10.50%					

Appendix VI - Feedback Questionnaire Results

RESULTS FROM FEEDBACK ON THE REFERENDUM
Questions 1- 4

Question 1- Preference		Question 2 - Ease of use	
Scale	# of Voters	Scale	# of Voters
1	112	1	107
2	54	2	62
3	18	3	18
4	6	4	8
5	6	5	4
6	1	6	0
7	3	7	1
Mean	1.78	Mean	1.72

Usefulness Question 3 - of information		Usefulness for Question 4 - guiding public policy	
Scale	# of Voters	Scale	# of Voters
1	107	1	89
2	52	2	52
3	31	3	34
4	7	4	14
5	2	5	4
6	0	6	5
7	1	7	2
Mean	1.75	Mean	2.08