

THE DEVELOPMENT AND APPLICATION
OF ECOLOGICAL DESIGN PRINCIPLES -
A CASE STUDY: KING'S PARK, WINNIPEG

by BRIAN DONALD PARKER



A Practicum

submitted in partial fulfillment of the
requirements for the degree of
Master of Landscape Architecture
in the Faculty of Architecture
The University of Manitoba

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Abstract

The purpose of this practicum is to present an alternative to the over reliance on physical and cultural traditions that shape present urban park landscape design. These traditional approaches are based on the philosophical, religious, economic and scientific beliefs that Western man has developed since the Scientific Revolution. Their major emphasis is upon physical and cultural traditions.

Mankind's perception of his place in the natural world began to change with the Scientific Revolution and the philosophies have implanted themselves into present day design processes. An alternative approach is to develop design standards based on ecological principles. These recognize the inherent qualities and characteristics of natural processes and allow the retention of nature within the urban fabric. In order to do this, traditional environmental perception must be understood in context with present design needs, rather than with traditional methods and philosophies. Through understanding the motives of the past, alternative solutions may be more effectively implemented in the present. This practicum examines this relationship and offers suggestions and methods for landscape design

that include a more holistic approach, with increased ecological sensitivity.

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Chapter One

Introduction

This practicum is based upon the realization that ecological principles have played a minor or non-existent role in much of the traditional urban park design in the twentieth century. While the objective of this practicum is to design an urban park using ecological principles, the question to be answered first is what factors have kept this from happening in the past and still prevent it from becoming common practise? The writer contends that by creating an awareness of traditional cultural perceptions and biases that an argument for the application of ecological principles in urban landscape design will be recognized as valid and valuable.

Western cultural attitudes towards the environment are the result of numerous and varied perceptions. For instance, present day urban sprawl does not incorporate ecological process because it removes and degrades agricultural and natural areas. Conversely, Blackstone (1974) presents a number of points that could be incorporated into an ecological attitude; (1) the acknowledgement that man can in fact cause irreversible changes in nature; (2) the awareness that

our environmental resources are finite and that we must learn to recycle scarce, non-renewable resources; (3) recognition that our environment has a limited capacity to absorb waste and pollution and these should be harmlessly recycled, also pollution can irreversibly effect natural systems; and (4) acknowledgement that finite resources cannot support an indefinitely expanding population or technology. Such environmental attitudes are the product of value systems derived from cultural perceptions. These perceptions are based on a variety of factors including religion, science, philosophy, literature and economics. To date, the problem lies in society being unwilling or unable to wholly understand or define the role of nature in modern society.

There is a threshold whereupon society will act to protect some aspects of nature, but the time has come for a broader understanding of the man-nature. In the design profession the logical method of allowing people to understand such principles is through the use of examples of nature, and the presentation of opportunities for human interaction with nature or natural processes. This can be accomplished by the adoption of ecological principles into design whereby the public becomes aware

of nature's existence other than in national parks or on television documentaries.

In 1854, George P. Marsh's book "Man and Nature; The Earth as Modified by Human Action" was recognized as one of the first definitive texts to question man's role in the environment and the subsequent result of his actions upon the landscape. While concentrating on natural hazards and agricultural methods, Marsh also understood that man's...

"...inability to assign definite values to ...[the]...causes of the disturbance of natural arrangements is not a reason for ignoring the existence of such causes in any general view of the relations between man and nature...it, is another step towards the determination of the greater question, whether man is of material nature or above her."

It is mankind's inability to assign definite values to environmental perceptions that results in arguments between such issues as nature preservation and the extraction of natural resources. This chapter will present some of the philosophical background for Western attitudes toward the landscape, as well as philosophies for positive environmental action which have shaped current attitudes.

Religion

Religion has had various roles in defining man's relationship with the environment. Given the numerous

schools of religious thought, it is likely that various cultures would have different perceptions of the man-nature relationship and produce different attitudes toward it. Lynn White Jr.'s thesis "The Historical Roots of Our Ecologic Crisis", (1967) suggests that the basis of our ecological use and abuse is Western man's belief and acceptance of Biblical axioms. Differing from the Greco-Roman's cyclical view of the world process, Christianity not only saw time as linear and nonrepetitive, but as having a definite beginning and end. This goes against the cyclical nature of ecological processes. The anthropocentricity of Christianity established a dualism between man and nature, with man serving God's will. Watt, et al. (1977) define dualism as man existing separately from the natural environment, superior to it, having a right and responsibility to dominate it and use it to further his own interests. Against the animistic religions of the past, with a spirit in every natural object, Christianity allowed the indifferent utilization of Nature. The response to Dualism is Monism, the acceptance that man is part of nature and must live in harmony with it. Under Monism society must adjust to the environment rather than attempting domination. Rene Dubos (1972) proposed that the Benedictine role was more relevant to modern society. The Benedictines

successfully practiced a stewardship of the landscape, altering the land, yet maintaining environmental quality. A Benedictine, Brother Steindl-Rast's (1971) paper on theology's contribution to ecology reiterates the need for reverence to the whole environment. This is realized by being cognizant of the integrity of the environment and understanding that there are no gaps in the ecological processes of the environment. The result of not being ecologically aware is a reliance on the past through greed; impatience, preventing planning and indolence, subverting caring. These beliefs are realized in society today through the demand for material goods, poor planning, and lack of environmental consideration, all of which place demands on finite resources.

Found alongside the view of domination is that of stewardship. Stewardship implied man's responsibility to manage and protect the land as revealed in Genesis 2:15, 'And the Lord God took the man, and put him into the garden of Eden to dress it and to keep it'. Sir Matthew Hale's seventeenth century explanation of man's responsibility to nature was that;

the end of Man's creation was, that he should be the VICE-ROY of the great God of Heaven and Earth in this inferior world; his Steward, Villicus, Bayliff, or Farmer of this goodly Farm of the lower World...

The belief that a stewardship tradition is solely the invention of Christian teachings is predated by similiar beliefs of other religions and cultures. In the Islamic faith God places a viceroy or deputy to oversee the earth, to rule it in his place (Black 1970). Plato's Phaedrus noted that 'it is the responsibility of the animate to look after the inanimate.', where man was sent to look after the Earth in God's name. The belief that the Christian stewardship tradition could act as a control in the misuse of nature loses credibility when it is realized that its origin is found in non-Christian cultures of earlier times. Despite the fact that a stewardship belief exists in Christian theology, the dominant mode of environmental expression has been that of exploitation, in man's right to use the resources of the earth as he or she sees fit. Other factors have contributed to Christian theology to affect the misuse of the landscape in modern times.

Philosophy

Aldo Leopold (1949) identified a gap between society's awareness of the biological community and its ability to apply a land ethic to its components. Leopold identifies the problem of land abuse as society being

unable to comprehend the need to extend social ethics, ie. co-operation, to include the entire ecological community. The inability to apply an ethic lies in our society's value system replacing philosophical value for economic value. Leopold called for a land ethic that includes cooperation between community components and ensures their continued existence. In 'The Role of Values and Ethics in Environmental Concerns', Maloney (1973) points out that the abstraction of Western thought has altered the relationship between man and nature. The mathematical properties of Western culture produce a view of Nature that is no longer sensed or imagined, but rather selected for functional qualities. Human misuse of the environment can begin to be corrected with better knowledge of mankind's relationship to earth, in this case with ecological processes. In agreement with Leopold, Maloney believes this could be accomplished by the creation of values and ethics that are beyond self-interest. Mankind must begin to accept responsibility toward the form of the landscape just as God gave stewardship of the Earth to Adam.

Underlying society's analysis and ideology of environmental issues are philosophies based on a determinist-free will structure (Pepper, 1984). The

determinist philosophy had its origin in Hippocrates 5th century lecture on the influence climate and topography had on human health. By the 19th century this philosophy had evolved to include the effects of resource availability on population size and was influenced by Darwin's theories of natural law. Today's ecological version puts man within nature, dependent on it and answerable to its laws. An example of free will philosophy is existentialism, which separates human existence from that of other natural objects. Existentialism stresses the human personality and free will. Humans are unique and distinguishable from natural objects. This manifests itself in a belief that man cannot be explained through any system of universal law and results in a freedom to choose to do anything he wants. A freedom to work with or against nature. This belief is related to phenomenology, an extension of existentialism that stresses the 'intentionality' of human awareness toward the environment. Edmund Husserl, phenomenology's founder, believed that if man was not conscious of parts of nature, then to all intents and purposes those parts did not exist. Nature did not have value or a right of its own without the relationship to man. The basis of existential thought is the separation between man and the natural world that occurred during the

scientific revolution between the 16th and 18th centuries. With its association with capitalism, the scientific revolution has become the basis of Western technocentric beliefs. It is a rational, scientific approach related to economic rationalities toward the solving of problems through higher authorities, ie 'experts' (Pepper, 1984). The pre-scientific era of the 12th and 13th centuries was characterized by the merging of Aristotelian and Christian ideas, resulting in a physical description of the world as the centre of the universe. The Universe was governed by principles that were expressive of God's purpose. The Earth was viewed metaphorically, nature was a book, to be read to discover God's purposes. Even though God was very important to the scheme of things, anthropocentric views continued to develop. Nature in its various forms was viewed as either perfection or imperfection, revealing human values. The affect of the scientific revolution was to identify nature mechanically, to see it as a machine. Of great influence to the scientific revolution was Rene Descartes, whose Reductionist philosophy widened the dualism between man and nature. Descartes distinguished man from nature through the principle of systematic doubt, whereby man's facility to think, established human existence over matter that could not think. Nature became identified by the

primary qualities of mass, time and length. It was man's rational thought that gave secondary qualities of color, hardness or texture to nature, furthering the separation. While Descartes defined nature to man it was Francis Bacon who promoted the use of scientific knowledge to control nature (Baconian Creed). Bacon's justification of scientific research was based on the value of accumulated knowledge and on the scientist's duty to improve mankind's material wellbeing. This was achieved by understanding how nature worked, the mechanistic theory, and using the laws of nature for man's benefit. 'For the whole world works together in the service of man; and there is nothing from which he does not derive use and fruit...in so much that all things seem to be going about man's business and not their own' (Bacon, *Sapientiae Veterum*).

The opposite pole to technocentrism is ecocentrism (Pepper, 1984). Ecocentrism holds the view that man is a part of the global ecosystem and by that relationship answerable to the laws of nature. Inherent in the view is a sense of respect for nature in its own right and characterized by constraints to economic and population growths. While not against science, ecocentrism believes in the essential need for a sense of value in technological decisions. This

'know-what' attitude can be compared with the 'know-how' attitude of science (Schumacher, 1973). Know-how disregards questions of morality for the sake of achieving technical accomplishments. The know-what attitude questions which accomplishments are right or wrong to pursue. Ecocentrism is often viewed as subjective and emotional in comparison to the 'rational', 'objective' approach of science. Ecocentric thought has its origins in the Romantic period of the 19th century. Based on the Greek belief of a Chain of Being, a hierarchy of all creatures, Romantic period literature, art and philosophy promoted the belief of the uniqueness of all things. Inherent in this belief was the relationship of all creatures being dependent upon the totality of the entire chain. To lose one creature, one link, meant the disruption of the entire cosmic order. This belief found its way into the ecological principle of diversity equals stability. Reinforced by the romantic belief of individuality and right to life, ecocentrism developed a humility that saw all things as equally important. Man was recognized as being in the middle of the chain, above the lesser creatures but below the angels and the planets. The Chain of Being provided a plan for 18th century biology, by promoting concepts of interdependence, evolution, niche and diversity and

hierarchy. The fault in the Chain of Being was the socially unacceptable belief that everything was preordained, that any unequal attributes were meant to be and nothing could be done to change it. This was reflected in the acceptance of racial inequality which was objected to by social reformers of the 19th century. The reform movements discarded the belief of preordained role in life to pursue the idea that man could begin to control nature for his own purposes.

Romanticism

The romantic concept believed that Nature had an integrity of its own. The landscape of 18th and 19th century England, with practitioners such as Lancelot Brown, relied on an Aristotelian philosophy that Nature was incomplete unless improved by the hand of man. Landscapes were altered to represent an improved Nature and were a reaction to the highly rational landscapes of topiary and geometrical patterns of the previous century. This romantic reappraisal of nature is developed further in the first chapter under the English Landscape Gardening movement of the 18th and 19th centuries.

In the 20th century though, some factors continued to act against the social implementation of an ethical

model in dealing with land use decisions. The strongest factors are urbanization, technological application, and the economic system that supports them. Though modern development is identified with past philosophies, Cartesian Dualism and Baconian Creed, the existence of a bioethic in organizations such as Green Peace, the Sierra Club and the Audubon Society has indicated the need for developing a greater social awareness of the role ecology plays in design.

Science and Capitalism

To the developing Cartesian and Baconian beliefs of 17th century was added the philosophy of Humanism. Humanism saw men and women as masters of their own fate, concerned for the welfare of others, free to think and act for themselves. Scientific humanism promoted the believe that a reliance on technology would improve the existence of mankind. While technology and rational thought initially assisted in introducing countless social and economic reforms, the increasing reliance on science developed an anthropocentric attitude. This resulted in the domination and exploitation of the natural environment. One solution to reversing this dominant attitude lay in the application of an environmental humility (Relph, 1981). Relph argues that while there is potential good

in technology there is a need for quality, value and distribution of environmental components. A balance must be established to counter the over reliance on science to answer all social and environmental problems. Environmental humility, like Leopold's land ethic, suggests an alternative way of thinking and acting that respects and protects the inherent character of a place. This humility is accomplished by allowing the landscape to appropriate man. Appropriation is necessary to counter the anthropocentrism of Humanism and means accepting:

that everything has value simply by virtue of its existence, and recognizing that this acceptance further implies an obligation to protect and guard what exists so that this value is not destroyed or diminished (Relph, 1981, p.20).

How ideas such as stewardship and the Romantic influence came to be overridden by perceptions of domination and its resultant misuse is reflected in the increasing development of scientific and capitalistic thought. Watt, et al. (1977) believe that modern perceptions of nature are the result of cultural phenomena. One of the strongest is that of urbanization, which has deemphasized the role resources and the natural environment play in human affairs. The result is the perception that resources are limitless due to the lack of a true awareness of the fragility and finite nature of resources and the energy required

to develop them. This perception is compounded by advancing technology, in combination with national and international advertising and promotion. These actually increase consumer demand and resource consumption.

Whether or not mankind will alter this pattern of resource use is related to the right of the individual to follow his/her wishes over those of the collective voice. Western economic policies allow for individual initiative and often promote it. Higher values have been placed on the control of resources, manipulation and competition than on what is best for the community (Underwood, 1971). Until ecological decisions are based on the public good rather than the individual's right to unimpeded use, societal attitudes can change very little. The private landowner will continue to do what is most expedient for himself (Leopold, 1978). The increasing amount of power available to private individuals gives them even more ability and incentive to seek the maximum return for their investment dollar.

Conclusion

Until western society acts in the best interests of the community, environmental attitudes will continue to be based on traditional methods and mores. One vehicle

through which public awareness can be developed is the urban public park. As a social service, provided for all citizens, a park provides a means of developing and promoting environmental awareness. Unfortunately, much of present day urban park planning is based on ideals created by and during the English Landscape Gardening style of the 17th and 18th centuries. While answering the need for greater urban open space, this tradition has impeded landscape design through the application of the narrow scope of its intended goals.

The following chapter reviews the English Landscape Gardening style, its practitioners and theorists and the forms and attitudes they generated.

Chapter Two

Introduction

The tradition of much of current urban park design originates from what is today commonly called the English Landscape Garden Style. This style is in reality the result of landscape practises and experiments which evolved in Tudor and Stuart England. From the early 1700's, garden design moved from the formal rigid style borrowed from the Italian and French, to the 'natural' landscape style typified by the works of Lancelot Brown and Humphry Repton. The development of the recognizable English Landscape was the result of various physical and cultural concepts. The growth of the social desire for personal estates as representative of culture, the idea of taste and the works of poets, philosophers and landscape painters all contributed to the evolution of the English Landscape Garden tradition.

Among the numerous landscape styles known, the French, Chinese, Japanese, Spanish, or Italian, it was the uniquely identifiable English Landscape Garden Style that produced the greatest influence on the North American continent and the urban parks which evolved. The purpose of this chapter is to review the

development of the English Style, its origins and the particularly English attitudes that created it. Synonymous with the English landscape is an identification with the natural environment, to the extent that English landscapes became identified with various philosophical representations of 'Nature'.

The Social Climate

At the beginning of the eighteenth century, social sentiments were strongly related to a reverence for the ideals of Augustinian Rome. The English upper class strongly followed and emulated these ideals. An attitude of intellectual priority guiding social acceptability grew to include such things as painting, architecture and the theory of a concealed natural order (Jacques, 1983). A metaphor borrowed from the Greek and Roman religions was that spirits inhabited the landscape. While not adopting pagan beliefs, the idea of the genius of place was convenient in characterizing the natural qualities of the English landscape. The genius of place allowed the intellectual study of a site and exposed potentials and inadequacies.

The existence of a particular landscape style derived from Nature was not an inherent English trait. In 1662

John Evelyn, a horticultural writer, described the supplanting of the Renaissance gardens of Hampton Court with;

sweet rows of limee trees, and the Canalle for water neere perfected... a rich and noble fountaine, of Syrens, statues &: but no plenty of Water...all these Gardens might be exceedingly improved, as being too narrow for such a Palace. (Malins,1966,p.6)

This first attempt by Charles II at transplanting the French style to England was not a complete success, the lack of water being just one reason. Work of a similiar nature was also begun at St. James Park a few months later, where Edmund Waller described;

For future shade, young trees upon the banks
Of the new stream appear in even ranks;
The voice of Orpheus, of Amphion's hand,
In better order could not make them stand.
(Malins,1966,p.6)

The French Style in England, as exemplified by the garden of Versailles, failed because of the very culture from which it stemmed. The major differences in social and cultural beliefs of England limited the French influence. Within France itself there was criticism toward the spirit of discipline, rule and proportion that was typified by the writings of the philosopher Boileau and the garden parterres, straight alleys and bosquets of Le Notre. Naturalistic plans produced by Charles Dufresny (1648-1724), a playwright,

were rejected as too expensive. As well, Bishop Pierre Huot (1630-1721) reproved the design of Versailles as;

factitious parterre, composed of earth brought together to a plan of M. Le Notre, having for its whole decoration but a few rows of box, which never distinguish the season by change of colour; surrounded by vast sanded alleys, very compact and very bare; such a parterre forms the delight of polite society. (Malins,1966,p.10)

But by the beginning of the 18th century a looser interpretation of garden design began to be seen in writings on Chinese gardens. Jesuit missionaries returning to France report on;

grottos, little artificial eminences...and how they transport thither by pieces whole rocks, which they heap one upon the another without any further design than to imitate Nature. (Malins,1966,p.11)

Fr. Attiret's 'Lettres Edificantes et Curieuses' (c. 1700) described the palace grounds of Emperor Ch'en Lung as containing a grand canal with lakes and palaces on rocky islands. The unrestricted style of the Chinese gardens appealed to the English mind and became associated with gardening literature.

The first reference in England to the Chinese style was that of Sir William Temple in his poem 'Upon the Garden of Epicurus' (1685). A well known politician, Temple retired early to his estate at Moor Park, Surrey, living life as the Epicurean philosopher he wrote about. While his own garden was very much derived from

French examples, he did write about the more natural style of the Chinese, saying that they were;

contriving figures, where the beauty shall be great and strike the eye, but without any order or disposition of parts, that shall be commonly or easily observed. And when this has been successful, they say the sharawadgi is fine or admirable. (Malins,1966,p13)

Temple further advised the interested to refrain from attempting such a style, as it was much too easy to go awry.

Malins (1966) saw the restraint of the French Style give way to English Democracy. At the beginning of the 18th century, English social sentiments were closely related to a reverence for the ideals of the Augustan age. The English upper class strongly followed and emulated these ideals and from them an attitude of intellectual priority guiding social acceptability grew to include painting, architecture and the theory of a concealed natural order (Jacques,1983,p.15). A metaphor adopted by the English from Roman religions was that of the genius of place, the characterizing of a landscape's natural qualities by the spirits it contained. The genius of place allowed the intellectual study of a site and exposed potentials and inadequacies.

In 1728 Alexander Pope saw this in garden layout thus;

in laying out a garden, the first and chief thing to be considered is the genius of the place. Thus at Riskins for example, Lord Bathurst should have raised two or three mounts because his situation is all a plain, and nothing can please without variety. (Jacques, 1983, p. 15).

The French subjugation of Nature by Art, as in the pruned trees and hedges and geometric plans, was perceived by the English as autocratic. This went against the Whig virtues of benevolence, moderation and reason and contributed to a growing contempt of French ways. John Locke believed that a contract between people and ruler, symbolically seen as freedom, might apply to the landscape in a contract between Art and Nature. This view was repeated by Alexander Pope in his 'Essay on Criticism' (1711);

But Critic Learning flourish'd most in France.
The rules, a Nation, born to serve, obeys,
And Boileau still in Right of Horace sways.
But we, brave Britons, Foreign Laws despis'd,

It was the work of John Vanbrugh with the landscapes of Castle Howard, Blenheim, Eastbury and Seaton that brought about the end of the French Style. At Castle Howard (1705) Vanbrugh maintained the natural qualities of Ray Hill to the east of the castle against the wishes of the royal gardener Wise, who wished to clip the forest into the shape of a star. At Blenheim

(1709) the lake north of the house was left with naturally meandering banks, rather than being channeled. Vanbrugh's desire to maintain a historical feature of the estate, at Woodstock Manor, would never have met the approval of Le Notre due to its detracton from the formal plan. Besides its historical significance, Vanbrugh also recognized;

That part of the Park which is seen from the North Front of the New Building, has little Variety of Objects. Nor does the Country beyond it Afford any Vallue. It therefore Stands in Need of all the helps that can be given, which are only two; Buildings and Plantations. These rightly dispos'd will indeed supply all the wants of Nature in that Place. And the Most Agreeable Disposition is to Mix them: in which this Old Manor gives so happy an Occasion for: that were the inclosure filld with Trees (principally Fine Yews and Hollys) Promiscuously set to grow up in a Wild Thicket; so that all the Building left (which is only the Habitable Part and the Chappel) might appear in Two Risings amongst'em, it would make one of the Most Agreeable Objects that the best Landskip Painters can invent. And if on the Contrary, this Building is taken away; there then remains nothing but an Irregular, Rugged, Ungovernable Hill. (Malins,1966,p.19)

Influence of Art

At the beginning of the 18th century there were few written guides available on the proper appreciation of painting. Two of the first were Jonathan Richardson's 'The Theory of Painting' (1715) and Ashley Cooper, 3rd Earl of Shaftesbury's 'Characteristicks' (1711). The freedom of Vanbrugh's work owed much to the Whig philosophy of Cooper, who believed in the goodness of

mankind and the virtue of passion over reason. This was counter to the rational philosophy of John Locke and supported by Pope his writings that;

Men's actions can never proceed immediately from Reason: the Passions are to the Mind as the Winds to a Ship.

From 'Characteristicks' Cooper revealed his perception toward Nature as;

rude Rocks, the mossy Caverns, the irregular unwrought Grottos, and broken Falls of Waters, with all the horrid Graces of the Wilderness itself, as representing Nature more, will be the more engaging, and appear with a Magnificence beyond the formal mockery of princely Gardens.

Cooper supported the theme of mankind attaining virtue through the presence of Nature's harmony and order, an order reinforced by the placing of statues of;

virtue, fortitude and temperance; hero's-busts, philosopher's heads; with suitable mottos and inscriptions;...with all those symmetrys which silently express a reigning order, peace, harmony and beauty! (Malins, 1966,p.21)

It was Richardson's desire to see painting recognized as a liberal, as opposed to a mechanical art. Until this time, landscape painting was seen to have no intellectual content, below that of portraiture and historical themes. In garden layout, temples were often used to describe allegorical themes of political and moral importance, ie. Venus, Bacchus, fame or

friendship. Aaron Hill's description of an allegorical garden (1733) relied instead on one's imagination; it is imagination that does all, in this amusement. (Jacques, 1983, p.17)

It was Hill's hope that the viewer would become involved in the landscape and take the dedicated grottoes of riches, learning, honour and independence as an allegorical representation of the essential good in man. It was the belief in the power of the human mind to create imaginative impressions that would reduce the impact of contrived constructions. This attitude was common in the initial phases of the Natural Style, when many gardens drew upon Greek and Roman mythology as well as Christian moral themes. Pope's (1715) translation of the Iliad borrowed strongly from the painterly images of colour, contrast and texture, and suggested a commitment to uniting painting to the liberal arts. A statement in the 'Free Thinker' (1718) supported this union, "The Perfection of a Master Painter is, to be able to perform the same wonders by Colours which a Poet commands by Language". Another influential writer of the period was Joseph Addison, who as editor of 'The Spectator' introduced many topical landscape themes to the public. In a 1712 essay Addison describes Nature as "more delightful than

artificial shows". This reflected a desire for a landscape that imitated art and at the same time grew in value as it came to resemble Nature. This view was derived from the writings of the the Greek philosophical essay entitled 'Longinus on the Sublime' (c. 1st-3rd century A.D.) which said;

that, therefore, Art should ever be brought in to aid Nature; where they are reciprocal the result should be perfection. (Prickard,1906,p.67)

Addison further discussed the designs of the Chinese landscapes which disdained the use of line and rule. In England the 'marks of scissors upon every plant and bush' compare badly to the landscape of Nature. It was Pope's admiration of the gardens of Chiswick, Down Hall and Sherborne that indicated his interest in garden design. He described the gardener Charles Bridgeman as being; "of Virtuoso-Class as well as I; (and in My notions of the higher class, since Gardening is more Antique, and nearer God's own work than Poetry)" (Jacques,1983,p.26). Pope's contribution to the design of Cirencester Park in 1710 was discussed in his

1731 'Essay on Taste' in which the gardener is advised to consult the genius of the place and who;

Calls in the Country, catching opening glades.
Joins willing woods, and varies shades from shades,
Now breaks, and now directs, the extending lines;
Paints as you plant, and, as your work, designs.
(Jacques, 1983, p.26)

Pope (1722) discussed the painterly application of perspective to the site of his garden at Twickenham saying that;

you may distance things by darkening them and by narrowing the plantation more and more toward the end, in the same manner as they do in painting, and as 'tis executed in the little cypress walk to the obelisk.
(Jacques, 1983, p.27)

Other considerations to the landscape were the use of light and shade. From 'De Arte Graphica' (1668) suggestions on the composition and execution toward the landscape were compared with the painterly parallel of centering a subject on a dark background in the 'Great Light'. In the landscape, the 'Great Light' was often represented by expansive lawns present in many gardens. Philip Southcote (c.1735) was also aware of the painterly potentials toward the landscape and was conscious of framing views. Pope (1734) was also conscious of gardening through the eyes of the

landscape painter, stating that; "all gardening is landscape painting...just like a landscape hung up" (Jacques, 1983,p.28). In 1752 Southcote repeated in the same vain that; "'tis all painting" (Jacques, 1983,p.29). Landscape practitioners began to see the potentials for applying painting techniques to the 'natural' style of gardening.

William Kent (1684-1748) a painter, applied Switzer's theories of landscape design to the gardens of Chiswick and Rousham. At Chiswick (1733/34), Kent retained much of the formal French style, but introduced a few sinuous canals, pathways and cascades. It was at Rousham (1738-41), that more drastic changes were undertaken. A movement away from the heavily clipped plants of the formal style gave way to an unrestrained natural growth. Kent, Pope and Switzer all advocated or practised a natural approach to the landscape and the changing taste in landscape styles was exemplified by Lady Hertford's statement regarding her estate Richings, (1738-41) where..."the environs perfectly answer that title and come nearer to my idea of a scene in Arcadia than any place I ever saw" (Jacques,1983,p.32). At Kent's next site, Stowe (1730's), he removed the formal gardens from around the house and opened views to the lakes and architecture.

The lakes were remade in sinuous patterns and acted as sites for many of the forty buildings designed for the property. Kent's work in the Natural Style at the estates of Chiswick, Claremont and Stowe was identified by an irregularity of planting around Palladian or rusticated temples, grottoes or cascades. The use of flowers was not allowed, turf taking the place of these. In addition, the use of irregular water features ie. serpentine rivers and lakes, was also on the increase and seen as an integral part of the new landscape. The source of Kent's inspiration for his landscapes may have been derived from various Arcadian or Paradisiacal images known at the time. One such version came from Dutch paintings that represented Paradise as a wild irregular landscape, filled with plants and animals, typified by paintings by Jan Breughel the elder and Rubens. The stage designs of Inigo Jones, Sir James Thornhill and Filippo Juvarra may also have been seen at this time in London (1720's). Jones drew inspiration from the imaginary landscape of Arcady, a pastoral landscape inhabited by Greek shepherds while Juvarra's examples were related to the classical images produced by the painter Claude Lorrain. One of the most influential gardens of the 1730's was that of Stowe. Described in books and engravings, Stowe was a large scale landscape based on

the Classical image of a Greek valley. The even larger landscape of Stourhead (1741-51) also followed the allegorical inspiration of the classics. Based on Claude Lorraine's painting 'Coast View of Delos with Aeneas' (1672), the landscape contained many Kentian characteristics; grottoes, statues, Palladian architecture, but differed in its massive irregular planting. The landscape of Stourhead was not unlike a tour of the mythological theme it represented. In addition the plan was also seen as a moral and philosophical investigation into the meaning of life and death.

Influence of Literature

Robert Castel's book the 'Villas of the Ancients' (1728), offered three styles of landscape design as practised by the ancient Greek. The first involved leaving the land untouched save for planting of trees where they would grow best. The second was based on the more regular 'rule and line' method of design and the third method was a combination of the previous two and called 'Imitatio Ruris'. It was the purpose of the third to allow for the amenities of a regular design without removing the irregularities of Nature. Art was to imitate Nature without being apparent in the raw materials of the design.

Pope, a good friend of Kent, wrote much on his beliefs about gardening. Pope's rules of design were 'contrasts, the management of Surprises and the concealment of Bounds' (Malins, 1966, p.37) He achieved contrast by using irregular patterns and serpentine lines, surprise by the use of an underground tunnel in his grotto and the placement of architectural features around corners and the concealment of the boundary by opening views and directing plantings to infinity.

Pope's criticism of the formal style was vented in his 'Epistle to Lord Burlington' with 'Timon's Villa'.

At Timon's Villa let us pass a day,
Where all cry out, 'What sums are thrown away!'
So proud, so grand, of that stupendous air,
Soft and Agreeable come never there.
Greatness, with Timon, dwells in such a draught
As brings all Brobdignag before your thought.
To compass this, his building is a Town,
His pond an Ocean, his parterre a Down:
Who but must laugh, the Master when he sees,
A puny insect, shiv'ring at a breeze!
Lo, what huge heaps of littleness around!
The whole, a labour'd Quarry above ground.
Two Cupids squirt before: a Lake behind
Improves the keenness of the Northern wind.
His Gardens next your admiration call,
On ev'ry side you look, behold the Wall!
No pleasing Intricacies intervene,
No artful wildness to perplex the scene;
Grove nods at grove, each Alley has a Brother,
And half the platform just reflects the other.
The suff'ring eye inverted Nature sees,
Trees cut to Statues, Statues thick as trees...

Another acquaintance of Pope's was Ralph Allen, whose estate Prior Park he often visited. The importance of

Allen was his use as the prototype of Squire Allworthy in Henry Fielding's 'Tom Jones' (1749). The Squire's site was:

In the midst of the grove was a fine lawn, sloping down towards the house, near the summit of which rose a plentiful spring, gushing out of a rock covered with firs, and forming a constant cascade of about thirty feet, not carried down by a regular flight of steps, but tumbling in a natural fall over the broken and mossy stones, till it came to the bottom of the rock; then running off in a pebbly channel, that with many lesser falls winded along, till it fell into a lake at the foot of the hill, about a quarter of a mile below the house on the south side, and which was seen from every room in the front. Out of this lake, which filled the centre of a beautiful plain, embellished with groups of beeches and elms, and fed with sheep, issued a river, that for several miles was seen to meander through an amazing variety of meadows and woods, till it emptied itself in the sea, with a large arm of which, and an island beyond it, the prospect closed.

The description was of Prior Park and Fielding returns later to describe it again.

At Eshur, at Stowe, at Wilton, at Eastbury and at Prior Park days are too short for the ravished imagination; in some of these, art chiefly engages our admiration while we admire the wondrous powers of art in improving nature; in others, nature and art contend for our applause, but, in the last, the former seems to triumph. Here Nature appears in her richest attire, and Art dressed with the modestest simplicity attends her benignant mistress. (Fielding, 1952, Book XI chapt. IX, pp. 467/469))

Apart from theoretical writings of the period, practical advice was given by Stephen Switzer's horticultural 'Ichnographia Rustica' (1742). This source was derived from early works entitled 'The

Nobleman, Gentleman and Gardener's Recreation (1715) and the 'Practical Kitchen Gardener' (1727). His criticism of the 'medley of Clipt Plants, embroidery etc.' of formal gardens was counter to his recommendation for moderation. Switzer believed that pleasure and profit should be considered, as well as the *ingentia rura*, the Grand Manner as opposed to the French style and most importantly the need of a prospect from the house. One of his favourite arguments was the need not to cut down large old trees to make way for geometric plans. The summary of his book was that design must yield to Nature rather than the opposite.

In 1739 Philip Miller's new edition of the 'Gardener's Dictionary' recommended serpentine walks and an opening up of the countryside against the formal, regular gardens previously created. The transition to large scale park landscapes, aided by Kent's pastoral images and examples from Rousham, Claremont and Esher, resulted in the abandonment of the formal French influence still present in the 1740's. Two influences from the 1730's were the Chinese and Gothic revivals. Concurrent with their appearance was the search for an identifiable English Style. While neither style had a profound physical effect on the landscape, the

antiquarian atmosphere of the Gothic Style promoted a national identity. The Gothic architecture lent a sense of historical continuity to the landscapes upon which they were sited. With the occurrence together of the Natural Style of gardening and Gothic architecture came the perception of the landscape as being synonymous with a national style.

James Thomson's poem 'The Seasons' (1726-30) was influential in creating an appreciation for natural beauty in a time that gave it little recognition. The poem was credited by Joseph Warton with, "diffusing a general taste for the beauties of nature and landscape" (Malins, 1966, p.57). Thomson, using descriptions seldom seen or applied to the landscape, created a painterly image of Nature's colours, textures and movements. It was the picturesque view that Thomson appreciated most, those views of the natural landscape where;

The negligence of Nature, wide, and wild
Where, undisguised by mimic art, she spreads
Unbounded beauty to the roving eye.

In 1751 Joseph Spence set down his rules of garden layout. The first was the by then standard of consulting the genius of the place. His advice on following Nature, from Pope's examples, was that... "Gardening is an imitation of 'Beautiful Nature'

and therefore should not be like works of art"
(Jacques,1983,p.54). He later stated that;

The chief aim of our best designers... is TO IMITATE NATURE. Not like the Dutch painters, who often choose to copy nature in her lowest and most disagreeable works, nor like Michael Angelo Caravaggio who takes to her indifferently as he finds her, nor like Guido Reni who often hides or disguises her with a profusion of grace and beauty but like Raphael, who follows her always with a careful judgement and a happiness of choice (Jacques,1983,p.56).

From this came the rules: 'To correct or conceal any particular object that is disagreeable' and 'To open a view to whatever is particularly agreeable'
(Jacques,1983,p.56).

The Question of Taste

Francis Hutcheson built upon the aesthetic tradition of Cooper in his 'Inquiry into the Origin of our Ideas of Beauty and Virtue' (1725). Hutcheson believed that he had defined a universal and absolute Beauty based on natural examples of Uniformity amidst Variety. This Beauty was recognizable to a person of taste through superior perception. Mark Akenside's 'The Pleasures of Imagination' (1744) paraphrased much of the writings of the Greek paper 'Longinus on the Sublime' regarding the origins of Sublimity and Beauty. The themes of the verse were those aspects of one's intellect that form

the imagination. He chose two, the Sublime and the Beautiful. Sublimity was defined by majestic forms, wide horizons and large rivers; Beauty was found in smooth, colorful and cheerful objects. This paralleled Addison's essay in the 'Spectator' no. 412 (1712):

beauty, which immediately diffuses a secret satisfaction and complacency through the imagination, and gives a finishing to everything that is great or uncommon. The very first discovery of it strikes the mind with an inward joy, and spreads a cheerfulness and delight through all its faculties. (Malins, 1966, p. 82)

David Hume believed that the search for a standard of taste was non-existent. From his 'Essays, Moral, Political and Literary' (1759) came the opinion that the mind inherently would develop a sense of taste applicable to the arts. This was opposite Hutcheson's belief, that education was necessary in the development of taste.

William Hogarth's 'Analysis of Beauty' (1753) was an attempt to define that idea of taste. From an artist's viewpoint, Hogarth's ideas may have had more validity than some of the moral philosophers. His principles included fitness, variety, uniformity, simplicity, intricacy and quantity. Hogarth illustrated each of these principles, eliminating any doubt to their exact meaning. His precepts on line were most often quoted. It was the serpentine and waving line that was

considered representative of Beauty and Grace. The serpentine line observable in Nature was;

simple, plain and true in all her works: and appearances in their infinite varieties, are guarded against and prejudiced bias from truth. (Malins, 1966, p. 86)

The belief that taste had its basis in Nature was a topic of much discussion during the 1750's. William Whitehead remarked in 1753 that;

Taste, in my opinion, ought to be applied to nothing but what has strict rules annexed to it, though perhaps imperceptible by the vulgar... People may have whims, freaks, caprices, persuasions, and even second-sights if they please, but they can have no TASTE which has not its foundation in nature, and which, consequently, may be accounted for. (Jacques, 1983, p. 57)

The belief that taste was derived from Nature found a supporter in Horace Walpole. A 1753 article in 'The World' discussed the realism of the theatre as;

in gardening, the same love of nature prevails. Clipt hedges, avenues, regular platforms, straight canals have been for some time very properly exploded. There is not a citizen who does not take more pains to torture his acre and half into irregularities, than he formerly would have employed to make it as formal as his cravat. (Jacques, 1983, p. 58)

Henry Home, Lord Kames, writer of 'The Elements of Criticism' (1762), took the rational approach to landscape Taste. He believed that Taste was a result of study rather than inherent emotions. In this he paralleled Joshua Reynolds's belief in taste being derived from wide readings in literature and moral

philosophy and the comparative analysis of great art. As for recognizing the garden as art, Reynolds believed that without art, ie. only with picturesque Nature, the garden ceased to exist. Above all, Reynolds believed that;

reason, without doubt must ultimately determine everything; at this moment it is required to inform us when that very reason is to give way to feeling. (Malins, p. 91)

The Picturesque and Beautiful

Edmund Burke's 'Enquiry into the Origin of our Ideas of the Sublime and Beautiful' (1756) also drew heavily from Longinus. Taking his definition of sublimity from Longinus, Burke modified it somewhat to fit his own aesthetic theories. Awe-inspiring grandeur as opposed to elegance was applicable to either speech or the landscape. In either form it was capable of lifting one's thoughts. Longinus believed that it could be achieved in speech or writing, supported by emotion, as long as it followed the constructed aspects of amplification, variation and climax. Differing from Longinus in the need for an overall scientific base to an image, Burke thought that the basis of Beauty was love, which 'demands no assistance from our reasoning, so proportion and measurement play no part'. This allowed one to walk into an informal garden and

experience it emotionally rather than trying to define the rational order of formal one. His idea of Beauty included that defined by the small and smooth, as in slopes and streams or fur or feathers of animals. His next quality, Gradual Variation, is similar to that of Hogarth with the exception that Burke would not accept angular features, being too much a product of reason. The last two expressions of the Beautiful are defined by Delicacy, and the resulting clarity and diversity of colour.

Reynolds's beliefs fueled those of Lancelot Brown, an individual who had the social and political ties and personal aptitude to handle the large scale plans that were becoming common. Following examples of painters like Claude Lorraine, Brown attempted to produce an abstract idea of Nature in landscaping. His belief of Nature was that unless touched by the hand of man it could not be recognized as beautiful. Brown's examples were similar to writer Richard Owen Cambridge's theory of Nature, in that "the earth was created irregular and various, and that improvement should seek to return it to a state of nature" (Jacques, 1983, p.69). The result of Brown's perception was that Nature became identified with manicured turf and groves as opposed to an untouched wilderness. An example of the scale that

Brown was applying the Natural Style to was exemplified by the hunting park of Blenheim (1764) with 2120 acres. This compares with the 250 acres of Stowe and 323 acres of Painshill. To some though, Brown was seen as too extreme in his removal of existing designs, to the exclusion of any but his own. Criticism was widespread and found in a variety of sources. Brown's works were also satirized in the theatre.

David Garrick's play 'Leth or Esop in the Shades' (1740) poked fun at the supposed improvements to the underworld based on Brownian practises. Again, in 1766, Garrick's 'Clandestine Marriage' satirizes the numerous improvements of Brown; his 'smack smooth lawn', a path 'twisting and turning' and the artificial 'spire' to end a prospect. This scene was also reproduced in Johann Zoffany's painting of the same name. Not all analysis of Brown was negative. He recieved the support of William Mason in 1757 with his removal of formal influences at Richmond.

Come then, prolific Art, and with thee bring
The charms that rise from they exhaustless spring;
To Richmond come, for see, untutor'd Brown
Destroys these wonders which were thy own.
Lo, from his melon-ground the peasant slave
Has rudely rush'd and levell'd Merlin's Cave;

Knock'd down the waxen Wizzard, seiz'd his wand,
Transform'd to lawn what late was Fairy land;
And marr'd with impious hand, each sweet design
Of Stephen Duck and good Queen Caroline.
(Allen, 1958, p.138)

Brown's work includes much from Burke's definition of Beauty: smoothness in lawns, slopes and plantings; Gradual Variation in serpentine patterns; and a bright clarity of design. From Hogarth, the use of Variety creating Fitness could be seen in perspectives.

Two books written in the 1760's dealt with the how-to-do aspect of garden design. Lord Kames' 'Elements of Criticism' (1762) was concerned with establishing rational principles based on scientific criticism. Kames developed a hierarchy of the senses, intellect being at the top and the more sensual pleasures of sight, touch, scent and hearing at the bottom. The book's message to the gardener was that they should attempt... "to humour and adorn nature, [that] is the perfection of his art" (Jacques, 1983, p. 92) The other book was William Shenstone's 'Unconnected Thoughts on Gardening' (1760). From his poet's background, Shenstone believed that the mind rather than the senses or the emotions were the source of Beauty. Each appears to have overlooked the obvious fact of the existence of a natural environment separate from the rationalization of the mind.

In the following years a number of authors put forth views on the role of Art and Nature. More frequently minds were turning towards the practical application of energies to the landscape. Topography, climate and finances began to act as restraints to garden design. William Mason's 1772 poem 'The English Garden', while assuring Art's presence on the landscape, cautioned against the total control of Nature by Art;

Great Nature scorns controul; She will not bear
One beauty foreign to the spot or soil
Shee gives thee to adorn: 'tis thine alone
To mend, not change her features.
(Jacques, 1983, p.106)

William Falconer (1782) reviewed the taste in gardening to the Literary and Philosophical Society of Manchester from the 'rational viewpoint' of politics and climate. On contemporary design, Falconer believed that;

the general method of laying out grounds, in this country, seems at present to be very rational. Natural beauties, or resemblances thereof, are chiefly attempted; which are the more proper, as being conformable to the climate and situation.
(Jacques, 1983, p.128)

With the Picturesque and Beautiful developing into individual schools of thought, Jean-Jacques Rousseau shifted support toward the Picturesque. Rousseau believed that Nature played on the emotions most when

in an unaltered state. He remarked;

I find that nature, in a garden, is not the same: she has more brilliance, but she does not move me as much. Men say, they make nature more beautiful- but I believe they disfigure her. (Jacques, 1983, p.94)

The development of an English School of print-making in the 1760's increased the awareness of the Picturesque qualities of Nature to the public. Engravings of Whitton, Woburn Farm, Painshill, Hall Barn and Kew Gardens by William Woollett set into motion a flurry of artistic production. Other artists included Richard Wilson, John Smith, Benjamin West and Joshua Reynolds.

One of the strongest promoters of the Picturesque movement was William Gilpin. He was concerned with the painterly appreciation of a scene rather than the still common search for Sublimity. Gilpin's (1792) 'Three Essays: On Picturesque Beauty, On Picturesque Travel, On Sketching Landscape' did much to outline taste towards the landscape. He criticized the use of classical motifs in the landscape, especially those used in isolation on the site. Regarding Blenheim's lake he said;

Brown himself used to say, 'that the Thames would never forgive him, what he had done at Blenheim'. And every spectator must allow, that, on entering the great gate from Woodstock, the whole of this scenery, (the castle, the lawn, the woods, and the lake) seen together, makes

one of the grandest burst, which art perhaps ever displayed. (Jacques, 1983, p.100)

From his 'Remarks on Forest Scenery' (1791) Gilpin commented on the use of trees in the landscape and noted that "Nature...seldom passes abruptly from one mode of scenery to another" (Jacques, 1983, p.144).

Gilpin saw the roughness of Nature as identifiable of the Picturesque and that smoothness could only be seen as beautiful. Further related to the ideal of the Picturesque was its affinity to being God's creation, whereas Beauty was derived from the works of Man.

Gilpin frequently criticized the overuse of stonework, statuary and buildings without proper regard to the natural character of the site. This was similar to William Cowper's recommendation for a spiritual humility towards Nature. This appealed to the poetic disposition of the public and turned them against aggressive improvements. Cowper's view of Nature was very personal and of an intimate scale. An idea of his attitude toward Nature is indicated from his 1782 poem 'Hope'.

Banks clothed with flowers, groves fill'd with
sprightly sounds
The yellow tilth, green meads, rocks rising grounds,
Streams edged with osiers, fattening every field,
Where'er they flow, now seen and now conceal'd;
From the blue rim, where skies and mountains meet
Down to the very turf beneath thy feet,
Ten thousand charms, that only fools despised,
As pride can look at with indifferent eyes.

The perception of Nature at this time was one of the cultivated landscape of the countryside and not the wilderness of North America or the idealized landscape of the Philosophers. Cowper was so enamoured by his vision of Nature that he lost sight of that fact and erroneously wrote;

God made the country and man made the town.
(Jacques, 1983, p. 129)

Nature was not to be investigated intellectually. Cowper believed that changes to estates were brought about by those of political and economic standing. His own advice to appreciating Nature was;

To trace in Nature's most minute design
The signature and stamp of power divine.
(Jacques, 1983, p. 130)

Cowper's criticism of Brownian improvements also displayed an aversion to the mistreatment of Nature;

Improvement, the idol of the age,
Is fed with many a victim. Lo! he comes,-
The omnipotent magician, Brown, appears...
He speaks. The lake in front becomes a lawn,
Woods vanish, hills subside, and vallies rise,
And streams, as if created for his use,
Pursue the track of his directing wand...
(Jacques, 1983, p. 130)

William Burgh's 1783 commentary on the picturesque principles of William Mason's 'The English Garden' supported the changes that were about to occur in the landscape. Burgh's definition of the Picturesque

principle was that a garden should be designed to display a succession of views so that each one would look as well as a painting. This became simplified to improving the landscape solely for its appearance rather than its content. This resulted in the search for an adequate foreground solution. In the mid 1770's the formal gardens of the early part of the century were seen as a problem to the Picturesque. Solutions for their removal were as severe as blowing up the terrace gardens of Powis Castle with gunpowder. Richard Payne Knight's objections to these proposals was counter to existing beliefs. He advocated the retention of the formal gardens, their terraces and overgrown plantings as an answer to the problem of a proper foreground for distant views. His own property, Downton Castle, contained many nontraditional characteristics. The use of intimate walks along a rough river, views of rocky cliffs and pools all lent an air of Picturesque wildness to the site.

After the death of Brown in 1783, the leader of landscape improvement in England became Humphry Repton. Entering the field late in life, and using his few political ties, Repton built up a clientele of some hundred patrons. Presenting his clients with options, the final decision on exactly how much the estate was

altered was left to them. It was not apparent that Repton ever held a particular view of an ideal Nature, though his writings were of an intellectual nature. His desire to be part of the social class of his clients left gardening style related to taste:

True taste in landscape gardening, as well as in all other polite arts, is not an accidental effect, operating on the outward senses, but an appeal to the understanding, which is able to compare, to separate, and to combine the various sources of pleasure derived from external objects, and to trace them to some pre-existing causes in the structure of the human mind. (Jacques, 1983, p. 136)

Of greater importance was Repton's ability to accept various styles of design. Repton was an admirer of the Picturesque, the Sublime and the Beautiful as proposed by Burke. Of the site Abbot's Leigh he wrote that;

walks in the woods on both sides the deep ravine will provide the most romantic scenery and these should neither be too highly dressed nor the natural effects injured by too much interference of Art. (Malins, 1966, p. 125)

His overriding interest in his clients image resulted in a concern for the Character and Convenience of a site. Character was necessary because;

We expect to see a marked difference in the stile, the equipage, and the mansions of wealthy individuals; and this difference must also be extended to the grounds in the neighbourhood of their mansions, since congruity of stile and unity of Character are the first principles of good Taste. (Jacques, 1983, p. 138)

This was accomplished by the use of architectural structures designating the extent of the owner's wealth. Repton's principle of Convenience was related to Taste and its sacrifice of the Picturesque. Leaving the choice to the client often resulted in having to work around formal areas, disrupting the overall design. Repton was upset by the criticism of Brown's work in Payne Knight's poem 'The Landscape' (1794) and argued against landscape painting and landscape gardening having similiar aesthetic origins. Knight wrote:

Hence let us learn, in real scenes, to trace
The true ingredients of the painter's grace;
To lop redundant parts, the coarse refine,

Open the crowded, and the scanty join.
But, ah! in vain: see yon fantastic band,
With carts, pedometers, and rules in hand,
Advance triumphant, and alike lay waste
The forms of nature, and the works of taste!
T'improve, adorn, and polish, they profess;
But shave the goddess, whom they come to dress,
Level each broken bank and shaggy mound,
And fashion all to one unvaried round;

Shav'd to the brink, our brooks are tought to flow
Where no obtruding leaves or branches grow;
While clumps of shrubs bespot each winding vale,
Open alike to ev'ry gleam and gale.
(Malins, 1966, p.148)

Both schools of thought were satirized in Thomas Love Peacock's 'Headlong Hall' (1816), where the faults of each school were outlined and the question of any absolute standard of design being possible were posed. Jane Austen also displayed a dislike for Reptonian standards in the novel 'Mansfield Park' (1814). Any

improvements to the grounds in the novel are carried out by the most disliked or unpleasant characters

In his 'Analytical Inquiry into the Principles of Taste' (1806) Knight includes landscape gardening with the arts of poetry, eloquence, music, painting, sculpture and the stage. It was his belief that each derived its pleasure from the use of the imagination, and appreciation was a matter of taste combining feeling and reason. Price's 'An Essay on the Picturesque' questioned certain criteria of Gilpin's theory on Picturesque principles. The differences were not great but prompted Price to produce his own theory on Picturesque Beauty. Price considered that present landscape improvements were the result of ignoring painterly principles of composition, harmony, unity of character and light and shade. Price was of the opinion that;

it is from attempting to make objects beautiful by dint of smoothness and flowing lines, that so much insipidity has arisen. (Jacques, 1966, p.147)

This criticism was directed at Brown's smooth turfed lake and river edges and the monotony of his designs. For Price, it was the emotion of curiosity that created the perception of Picturesque Beauty. Curiosity was derived from more than just the sense of sight, it also

included touch and hearing. Knight, in a poem dedicated to Price, outlined his own similiar preferences for design. He favoured the wild unkempt nature which painters had traditionally liked. For Knight the mechanically artificial roads, walks or follies were an insult to Nature. He suggested the use of native trees and the controlling of wilderness, merging the latter with formal gardens as one neared the house. Regardless of what was written, neither Knight or Price produced any physical examples of their theories on the landscape.

Another Reptonian critic was John Claudius Loudon, whose 1806 essay 'Treatise on Country Residences' outlined his theory on landscape styles. Loudon believed that 'taste is inherent in the human mind, though in degrees varying perhaps according to the education, habits, and moral sentiments of men' (Jacques, 1966, p.167). He listed qualities similiar to Repton's; utility, symmetry, order, contrast, variety, and intricacy, as well as his own of sublimity, beauty, deformity, picturesque beauty, sculpturesque beauty, wildness, age and ruin, and novelty. A primary theme of his design theory was what he called his

'characteristic' style;

I call it characteristic, because its leading principle is to create or heighten natural character. The other styles...produce a monotony of artificial character. (Jacques, 1966, p. 167)

The important factors of his theory were; to produce a lake that was natural looking rather than a still river; and to produce a forest of wild features rather than the smooth turf surfaces of Brown. Knight's 'Analytical Inquiry into the Principles of Taste' (1805) was, with Loudon's work, the last major contribution to the Picturesque debate. It centred on the Scottish School of aesthetics, inspired by the wild mountainous terrain, and was based on the use of imagination to produce pleasure.

The Picturesque movement, for all its descriptive writings; essays, poetry or prose, did not have as great an influence in practice as it appeared. Due in part to the lack of wild terrain for estates and also because later Victorian tastes lacked the visually trained personnel necessary to promote a Picturesque tradition. What it did achieve was the physical realization of the physical qualities, with associated emotional aspects, of the natural environment. The Picturesque was the culmination of ideas by

Shaftesbury, Pope, and Burke, creating an English landscape closely emulating Nature.

By the time of Repton's death in 1819, the landscape gardening movement had for all intents and purposes run its course. Its last major impact was in its application to the design of the public park system during the Reform Movement of the 1830's to 50's. The Reform Movement concerned itself with the increasing populations of urban areas, who's need for fresh air and space was neglected until the Park movement was initiated. The first public park was Victoria Park, London (1842) designed by James Pennethorne. Birkenhead Park, Liverpool by Joseph Paxton soon followed in 1843. Neither of these parks added anything new in way of design, being an eclectic collection of curvilinear lakes and drives, groves of trees, and various architectural details. The parks were more importantly recognized for their contribution to social reform than landscape design and the influence they had on future North American park development.

Urban Park Movement in North America

The public park movement in North America began with the plan for Central Park, New York in 1856. The

success of the park was related to the embodiment of Reptonian concepts by the designer Olmstead (Newton, 1971). The Romantic attitude that nature was improved through man's manipulation continued in the urban park systems of New York, Boston, Chicago and Canada into the late 1930's (Chadwick, 1966; Martin and Segrave, 1983; Wright, 1984). While new landscape forms have been introduced since then by people such as Garret Eckbo, Thomas Church, Laurence Halprin, Cristopher Tunnard and James Rose, too little of these developments has reached the urban park, for a variety of reasons. This is partly related to the application of the earlier design principles to urban parks. In addition, urban trends of growth and renewal combined with economic constraints resulted in a shift from urban parks of traditional forms to community open spaces (Francis, et al., 1984). These open spaces represent community designed playgrounds, gardens and parks, often using small vacant lots within residential zones. Hough (1984) identifies the traditional spaces as pedigree landscapes of lawns, flowerbeds, trees, fountains and planned places. Based on formal design principles and established aesthetics their success depends on high energy inputs and engineering and horticultural technology. Francis et al (1984) believe that the traditional open space fails to properly serve

the needs of the users. Even the environmental movement's increasing awareness of the benefits of urban parks as green lungs for the city is reduced by the shortage of available space in many urban areas. This attitude is further restricted by the present attitude that fails to accept the presence and operation of ecological processes within the urban landscape (Hough, 1984).

Conclusion

There was never a single inspiration for the design of the English landscape. In the 18th century, landscape perceptions fluctuated between the rational and emotional. The rational was based on the intellectual study of perceived nature in contrast with emotionally derived artistic and philosophical perceptions. Overlooked during the Landscape Gardening movement was the fact that Nature was never investigated scientifically, nor used as a guide in design. The English Gardening style required a culture that would support a landscape based on aesthetic and philosophical principles. Without a doubt there was an intense interest and concern for Nature in England, but in the literary debate the inherent truths of Nature were overlooked. The English need to create their own ideal of Nature resulted in a landscape that appeared natural

but was in effect a shallow interpretation. The realization that Man and Nature were components in a natural system was not understood or accepted until the rational scientific investigations of the 19th century. While the park movement in North America resulted in a greater awareness of the needs of urban populations, it was restricted by the increasing demands for site utility ie. playgrounds, sporting field and multi-use areas. Nature was thought of less as the basis of urban park design and more as a facade for the growing list of intensive activities demanded by the public. Park design began to reflect the architectural framework of the city rather than the natural character of the site.

The scientific basis for ecological design is now available yet its use as an alternative design form has yet to be completely accepted, as Hough (1984) notes. The following chapter will deal with the development of ecological principles and their influence on design and environmental perception.

Chapter Three

The Designer

Of importance in the planning process is the need for the designer to know his own motivation as well as all potential user needs and site capabilities. Manning (1979) sees Man's role as designer as;

The wish to control...[which] is ultimately based upon preference. Thus the designer, as he becomes more sensitive to natural factors, will become more an organizer of events (the initiator of a system as it has been termed) and less an arranger of artifacts, and his design may accordingly take on the form of a flexible structure within which details may change with the fluidity of natural processes.

Important to Hough's (1984) design philosophy is this concept of process. In traditional design the landscape is perceived as a static attempt, via maintenance, to retain the status quo. Nature on the other hand is dynamic, constantly responding to various natural influences. The result, Hough says, is that "design and maintenance, based on the concept of process, become more than separate and distinct activities but an integrated and continuing management function, guiding the development of the man-made landscape over time". Human development should consider the impact that negative constraints on the landscape produce. Rather than designing for minimum

acceptable disruption or wastage, humans must incorporate ecological processes into their environment. Rather than one way energy flows, the human environment must recycle its own products and inter-relate with the natural environment.

This capacity to see and understand one's own feelings on ecological design will allow the designer to accept that once started the design is never really completed. Rather than continue to strive for a fixed, static design, fighting natural processes, the landscape architect must consider himself as part of the process to achieve a steady state community.

The Ecological Philosophy

From the standpoint of environmental perception, the predominantly European field of Landscape Ecology expresses a holistic awareness and concern of the landscape. 'Landscape ecology' was defined by Carl Troll in 1938. A geographer, Troll was concerned with the natural environment as well as the landscapes including Man.

Emphasizing an anthropocentric approach, Vink (1983) defines landscape ecology as "an approach to the study of the landscape which interprets it as supporting natural and cultural ecosystems" and "the science which

investigates the relationships between the biosphere and anthroposphere and either the earth's surface or the abiotic components". An anthropocentric approach stresses the long-term as well as short-term needs of the environment, as well as defining the responsibilities of humans to the landscape and its biotic components. It is the premise of landscape ecologists that land use should be based on practical and theoretical ecological principles.

Man has the capability to destroy and create ecosystems, termed 'cultural ecosystems' or 'land utilization types' (Vink,1983). The pursuit of raw materials, energy, food or space, (ie. land use), is seen as a reflection of human needs. The protection of nature identifies not only human needs but human responsibilities. Naveh and Lieberman (1984) stress the need for a holistic approach to landscape planning based on conceptual factors and with an awareness of the limits and validity of knowledge.

Importance of Ecological Design Principles

At the present time the lack of ecological awareness as it affects design has resulted in the misuse or abuse of parts of the environment; the loss of agricultural land and wildlife habitat due to urban sprawl,

pollution, resource extraction or erosion. Caldwell (1972) identifies man as the 'unecological animal' who's historical interactions with the environment have reached a stage that threatens the existencs of life on Earth. Dasmann (1975) identifies four factors contributing to environmental degradation; population, pollution, technological growth and land use. Each factor can cause environmental damage of one degree or another, but collectively they produce what Dasmann terms 'minor' catastrophies, though some are undoubtably major. Watt (1982) defines environmental degradation as something useful [that] has been taken away from the environment, or destroyed. Erosion of agricultural land, deforestation or loss of species diversity are examples. The application of ecological principles to the design process allows man to reduce or remove negative impacts, maximize land use and ensure future presence of natural landscapes.

Landscape Design Principles

In the area of design it is the Europeans, particularly the Dutch and British, who most often address the need for and implementation of ecological principles in planning. Due in part to the finite space of their countries and diminishing natural areas, both countries have endeavored to protect and increase the natural

aspects of their environment. This is not to say that other countries have ignored ecological design. Sweden, (Gustavsson) Germany, (Vink) United States, (McHarg) and Canada, (Hough) are all proponents of ecological design. But it is predominantly the European countries however, that have gone beyond the analytical stage and applied ecological principles to landscape designs. "Landscape Design", the Journal of the Landscape Institute, introduced a series (1982) on the application of ecological components within the urban landscape with the intention of developing an awareness of the need for a green urban environment. From the initial article establishing ecological principles relating to design, to various on site development descriptions, the series proposes examples of design within the constructs of ecological principles.

In the introductory article in "Landscape Design", Tregay (1982) states the objective of landscape design as "the creative expression of the relationship between human society and nature through the medium of the landscape". Tregay believes the landscape profession must look to public aspirations for design inspiration, believing the public desires an increase in natural surroundings. The creation of a relatively natural

landscape would provide educational opportunities for children, stimulating play space as well as providing a vehicle for public participation in such aspects as decision making, labour and environmental education in the design process. Selman (1981) believes that ecology should be central to any design and is more topical now due to the growing perception of the limits of growth to human society. It is the awareness of 'human ecology' that reinforces the need for ecological content in design. Without consideration of environmental issues such as pollution, over-population or resource limitations, design would continue to fail to implement ecological principles. Gustavsson (1982) investigates the concept of 'nature in cities', and the related psychological, social and biological reasons for it. Studies by a variety of researchers, authors and practitioners throughout Europe have shown a parallel recognition for the need to implement ecological planning.

Manning, (1982) concerns himself with the organization of the landscape shared by man and nature. Within this landscape man is identified as having the central ecological role. Manning's definition of ecological design is the replacement of restrictive, artificial and expensive landscapes by a looser, more naturalistic

landscape identified by species diversity, structural complexity and freedom of growth. This can be achieved by the use of indigenous vegetation in natural growth patterns and maximizing the site potential. Manning (1979) identifies this with nine principles of landscape design.

1) Exploit the full natural potential of the site, which is derived from the interaction of such factors as physical extent, accessibility and continuity, topography, aspect, climate, soil quality, water regime, the distribution of vegetation and foliage canopy levels, and wildlife.

2) Conserve or develop diversity of habitat, by the protection or manipulation of the above features of the site, paying special heed to the value of complex edge zones (ecotones).

3) Encourage a full range of organic life, that is, a variety of species compatible with the site and with each other, representing all the categories of life from soil organisms upwards, and principally (but not necessarily entirely) native to the area.

4) Encourage the full cycle of growth from birth to decay, and with this a mixed-aged structure or 'mosaic' of elements at different stages of development.

5) Develop balanced self-sustaining communities capable of renewing themselves in the short term with a minimum of outside interference.

6) Control the system by management: of habitats, species and stages of growth in order to sustain an appropriate balance of elements into the future (for example, of open water against marginal growth, grassland against scrub), aiming at the lowest level of daily maintenance consistent with human uses of the landscape.

7) Create maximum variety of opportunity for man and nature to coexist in close proximity according to a spectrum of differing values, allowing site potential reinforced by management to influence the patterns of activity and separation of conflicting interests, on even the smallest piece of land.

8) Create a coherent landscape structure, derived from site potential, habitat diversity, and the separation of conflicting interests; perpetuated by management; capable of assimilating chance and variety without disorder; and providing a continuous sequence of aesthetic experiences through the interplay of landform, space and enclosure, light and shade, and all other sensory qualities of the landscape.

9) Design in four dimensions, accepting the need for continuous flexible design extending into the future.

Forego the total control of tradition as the price to be paid for the privilege of living with nature.

Further to system control, Manning distinguishes maintenance as the day to day care required to maintain a landscape in the condition of the appropriate moment; and management as an extension of the design that ensures the developing landscape reflects the original design as well as the present and future needs of the public.

While Hough (1984) views plants as successional and structural components of the landscape, attempts to implement ecological design principles into an urban area must be preceded by an acceptance that ecological processes have a place in the city. This can be accomplished by 1) co-operation with nature rather than working against it and 2) through the inspiration of the functional landscapes of rural areas. These functions can range from the production of timber, the protection of water, soil and natural features, enhancement of wildlife and recreation. Other design principles include the economy of means or principle of least effort, diversity, environmental education and human development. Environmental education refers to reversing the misconception that nature is everywhere but in one's backyard. This applies in particular to

children who derive exciting and interesting playgrounds from natural landscapes as well as an educational source.

Structural Aspects of Design

In Sweden, as in other countries, various approaches to ecological design exist. While there are differences in interpretation and design techniques the general emphasis had been on plant sociology, a plant's suitability to soil and climate. During the mid seventies design began to focus on plant structure. The structural approach is related to the analysis of horizontal patterns, vertical stratification (presence of different layers), plant strategies (the growth of plants together and their roles, from dominating to suppressed, from large trees to small individuals) in a dynamic system. Concentration on plant structure reduces the possibility of homogeneous form and character. Additionally, Gustavsson (1982) believes that thinking in terms of structure may help to relate landscaping to terms such as form and architecture, use and function. Vegetation forms identified are (a) high woodland, (b) low woodland, (c) edge, (d) half open land and (e) shrub.

Design considerations include;

1. Structures for frameworks; woodland, the edge and half open land.
2. The interior landscape, the neglected landscape - the use of canopy vegetation to establish enclosed spaces rather than open spaces defined by vegetation.
3. The difference between stands and shrubs - stands can be entered while shrubs cannot.
4. Different kinds of edges - varying from very complex to open types, the use of ecotones (abrupt changes) and ecoclines (gradual changes).
5. Special play structures - small scale, densely planted mosaics with a fluent design language seem to be much better than larger plantations, particularly if they are not so large as to allow pressure to spread or be hidden.
6. Meadows and flower fields
7. The mature and the newly established - newly established areas in Sweden are generally of neat appearance due to the neighbourhood character ie. housing or urban parks. The traditional notion that an area once established ceases to change due to maintenance reduces further management possibilities.

Management allows;

- a varied age structure
- a change from one young character to a very different mature character; for example, a change from lawn to meadow.

Ecological Principles

This section outlines some of the ecological concepts and processes the previous designers have used to develop design principles. The various concepts of ecology such as environmental influences, biogeochemical cycles and population dynamics have less immediate importance to the Landscape Architect than aspects of community organization and human ecology. These are important due to the structural components that communities display and the ability of man to act as a form determiner.

Concept of Ecosystems

The basis of ecological understanding is the concept of ecosystem, defined as;

a given abiotic physicochemical environment and its particular biotic assemblage of plants, animals, and microbes.

(Kormondy, 1984).

Various components and processes are defined as making ecosystems function. Odum (1983) lists three

components of ecosystems; the community, the flow of energy, and the cycling of materials. The result of the latter two processes in combination with biotic organisms results in each species having a unique ecological niche, defining its role in the environment. Billings (1966) lists three principles that appear to influence ecological relationships, (1) Principle of Limiting Factors; those factors that limit the growth, reproduction, and distribution of a species, (2) Principle of the Holocoenotic Environment; a principle illustrating the complexity of environmental interactions and how no component is separate from any other part of the environment, the ecosystem acts as a whole and (3) Principle of Triggering Factors; the removal of a limiting factor (eg. water) causes changes in the environment that eventually may lead to the replacement of one ecosystem by another (desert to oasis). There are two other concepts that should be considered in design, namely succession and disruption. Succession is the orderly process of change over time, from a simple to more complex state. It involves changes in both the biotic and abiotic factors of a community, with the final self replicating state known as a climax community (Rodgers and Kerstetter, 1974). Disruption and exploitation reduce species diversity

within an ecosystem, successional development is set back and stability reduced, figure I.

ECOSYSTEM PROCESSES

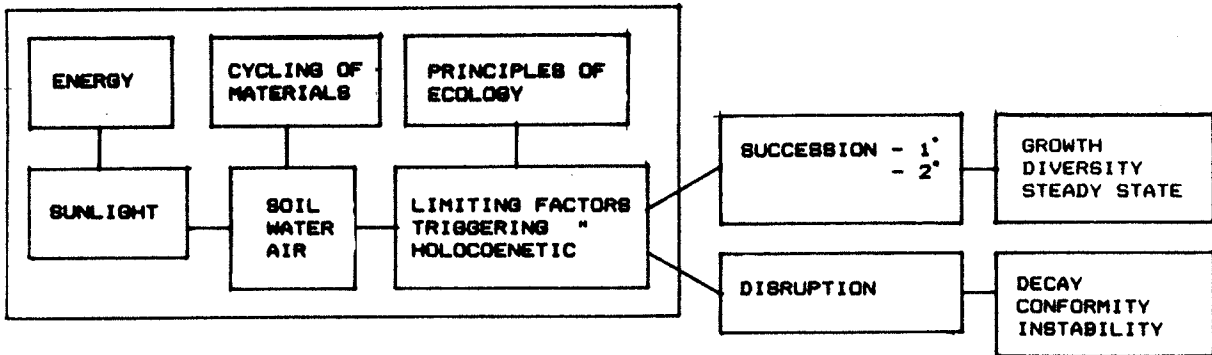


Figure I

Stated another way by Watt (1973);

stable environments allow the accumulation of biological diversity in mature ecosystems which in turn promotes population stability. A stable and diverse environment is the goal of landscape design.

Community Structure

In this study the basic ecological unit considered applicable to environmental design will be that of the community. Biotic communities are naturally occurring assemblages of plants and animals that live in the same environment, are mutually sustaining and interdependent, and are constantly fixing, utilizing, and dispensing energy (Smith,1974,p.21). Biotic communities are not static. Smith (1974) sees the structure of a terrestrial community being determined

largely by the character of the vegetation. Within a forest ecosystem there exists a canopy, understory, shrub layer, ground layer and forest floor levels. Without human interference or drastic climatic changes successional processes will eventually result in a stable 'climax' community governed to a large extent by the climate of the area. One of the most important concepts to understand in community functioning is that of energy flows. In any community approximately one percent of incoming solar radiation is used by green plants (Billings, 1970, p.80) The remainder heats the soil, air or plants, is reflected back to space or lost in evapotranspiration. In each ecosystem there are various trophic levels identified by the number of consumers positioned along the food chain. No food chain is completely efficient because energy is lost in respiration at each link along the chain. In a climax community the rates of photosynthesis and respiration, production and decomposition, are balanced. An excess of organic production over decomposition results in a successional community form, with its greater biomass and structure. If energy in the form of organic matter is removed from the community the system may begin declining in species diversity and stability. The result is that the community will begin to feed on its finite resources to maintain a stable steady state.

This can be exemplified by the organic matter on a forest floor being continually decomposed resulting in the recycling of many of its nutrients. If these nutrients are removed from the system (harvested) the forest's growth would be reduced. A modern farm functions in much the same manner. When organic matter is removed during harvesting, nutrients cannot be recycled. Cultivated crops therefore require fertilizer to provide nutrients and ensure productivity. In ecological design, the awareness of energy flows within communities creates an understanding of species fluctuations due to maintenance or management practices.

Bradshaw and Handley (1982) layout the groundwork for incorporation of ecological design using some basic ecological factors. Defining ecological design as working with nature rather than against it, design components include soil, climate, plants, animals and man. A brief discussion of each factor follows.

Soil - The dominant effect of soil is on the types of plants it supports, as well as the quality of their growth. In an ecological approach soil would be taken as a given with few or no structural or chemical changes planned. The ecological principle would be to select the plants for the soil type rather than the

reverse. This would reduce costs as well as allow for the gradual improvement of poorer soils through vegetational succession.

Climate - Climate delineates the type of plants that survive on the site. The authors are of the opinion that it is entirely acceptable to use foreign material that is climatically suitable, though the use of native material is still often overlooked. It must be remembered that plants may have an effect on the microclimate of a site.

Plants - The use of indigenous plant material will ensure growing success and require less maintenance. Due to the origin of the paper (British) the authors' again present the argument for use of foreign species, citing Britian's limited flora diversity. The factors of succession, diversity and stability are recognized as components of design. Most importantly in the area of flora is the recommendation that establishment of natural communities should be undertaken as naturally as possible. Though this will result in slow development of a site, public and client prejudice will have to be overcome.

Animals - Plants supply food for animals which in turn influence communities. Destructive insects can alter

communities, ie. Dutch Elm beetle, or act as population controls by eating other plants. Variety in the fauna can act as an indicator of floral diversity. For instance, variety of breeding birds is an indication of plant diversity. Structural diversity should be incorporated into landscape design, with natural vegetation corridors being defined and enlarged.

Man - Many ecosystems now considered valuable cultural landscapes are the result of modifications by animals, including man. The structure of some forests, meadows and waterways owe their form to modifications by man and his animals. The study of ecological maintenance on such things as road rights of way would indicate the need for study of suitable maintenance practices to achieve desired effects.

The Authors further identify the most important factor of ecological design as the maintenance of energy cycles. Without the constant input of energy, in the form of sunlight, into a system the community will slow down or degrade. In creating ecological designs the biological basis of the landscape must be incorporated but, by the very nature of ecology, no one formula is solely correct. The result of the preceding ecological design principles is that the product will be

distinctive, resilient, self-sustaining, economical and in harmony with the environment.

Processes of Community Development

A general outline of ecological processes is discussed with regard to their effect on community structure.

Primary Succession - is the evolution of a biotic community where no soil existed previously.

Secondary Succession - occurs when a community is destroyed, by natural or human activities, and succeeding communities are not generally required to build up a soil horizon. An activity such as farming replaces successional communities with simplified ecosystems. These simplified systems are maintained by the expenditure of considerable energy (Ehrlich et al, 1977, p.137).

Stability and Diversity - with the succession of a community to self sustaining state, a level of relative stability is achieved, though this may take thousands of years. Due to changes in the environment over varying periods of time stability has been represented as a steady state (Oosting, 1956, Whittaker, 1975). This means that species populations are regulated by birth and death rates, primary production matches that

of organic matter breakdown and energy input matches respiration energy released. Important to remember is that during a steady state the community is still a small part of a greater ecological system and as such is capable of displaying further successional change. Diversity within a community is related to the potential numbers of species each environment is capable of supporting. This varies with latitude and elevation (Smith, 1974, p. 242). While greatly simplified, a general principle acts within a community: stability is related to complexity [diversity] (Ehrlich et al., 1977, p. 138).

Conclusion

By no means comprehensive, the preceding review brings out the main concepts of ecological design. While author semantics produce slightly different explanations for the functioning and application of ecology in design, certain principles are continually repeated. From these I will summarize an outline of principles applicable to ecological design.

Design principles closely follow principles of ecology. As stated earlier, the basic ecological design component is that of the community. From within

communities are derived a number of design factors that are readily applicable to a site. These include;

1) working with, rather than against nature (Bradshaw and Handley,1982; Hough,1984; Manning,1979)

2) retaining regional landscape characteristics (Hough,1984, Manning,1982,1979)

3) using plant structure as the basis for ecological design, eg. horizontal and vertical stratification, ecotones and ecoclines (Bradshaw and Handley, 1982; Gustavsson,1982; Hough,1984; Manning,1982,1979; Tregay, 1982)

4) incorporating design based on a variety of ages in the biotic components (Gustavsson,1982; Manning,1979)

5) maintaining energy cycles, ie. energy inputs should balance with outputs (Bradshaw and Handley,1982)

6) planning for freedom of growth-management over maintenance (Gustavsson,1982; Hough.1984; Manning, 1982,1979)

7) permitting the interaction of man and nature - passive and active recreation, interpretive trails and athletic fields (Hough,1984; Manning,1979; Naveh and Lieberman,1984; Tregay,1982; Vink,1983)

8) design in four dimensions and acknowledge that time should be a component (Manning,1979; Hough,1984)

9) preserve, and include existing natural areas into design (Manning,1982,1979; Vink,1983)

10) create a coherent landscape from the above principles (Manning,1979; Tregay,1982)

The above principles can be further grouped into processes, structure and human ecology. It is essential that there is an awareness that an ecological design is a dynamic process, constantly fluctuating with various environmental influences. Ecological design must therefore include management plans, to ensure a changing future landscape. The designer must also remember that decay as well as growth is important in the design process and is essential for the self maintenance of a community. A balanced energy flow will contribute to a stable landscape and influence community structure. The holocoenotic principle establishes the interrelationship of ecological components and that nothing can function in isolation.

The structure of a plant community is dependent on a number of factors; succession, diversity and stability and various biotic and abiotic components. These include animals, plants, man and climate, topography, soil and water. The abiotic components act as determinants for the position and development of

plants, which are further influenced by animals, man and each other.

Human ecology - Selman (1981) believes that man's awareness of ecological problems, ie. pollution or resource depletion, reflects a growing appreciation for the value of implementing ecological principles into landscape design. As human awareness increases regarding the functioning of the ecological system, designers should begin to work more closely with ecological principles rather than producing static environments composed of traditional cultural artifacts (Manning, 1979). In addition, as user needs create a value spectrum for activities, ie. nature walks, designers will have to respond to these needs with appropriate ecological design.

In addition to the above principles, an awareness is needed of their appropriateness to design demands. Sites under high impact use, highly built up areas, urban centres, or sites that require fixed and unchanging designs may preclude the use of ecological principles.

In the final chapter I will apply the preceding ecological design principles to a case study site.

Chapter Four

This chapter outlines the process by which ecological design components can be applied to an urban park, King's Park in south Winnipeg.

Study Constraints

The following conceptual plan for King's Park is an application of the previously outlined ecological design principles to an urban park site, but it does not represent a best plan for it. The conceptual plan is a reflection the Author's biases and research, no surveys or questionnaires were undertaken to determine community needs or desires.

Study Site

King's Park is a designated regional park in the southern end of the city of Winnipeg, situated near the University of Manitoba. Encompassing approximately 40 hectares (100 acres) adjacent the Red River, the park is typical of a riverine flood plain landscape. It consists of heavily wooded banks with a series of flood terraces and upland open spaces.

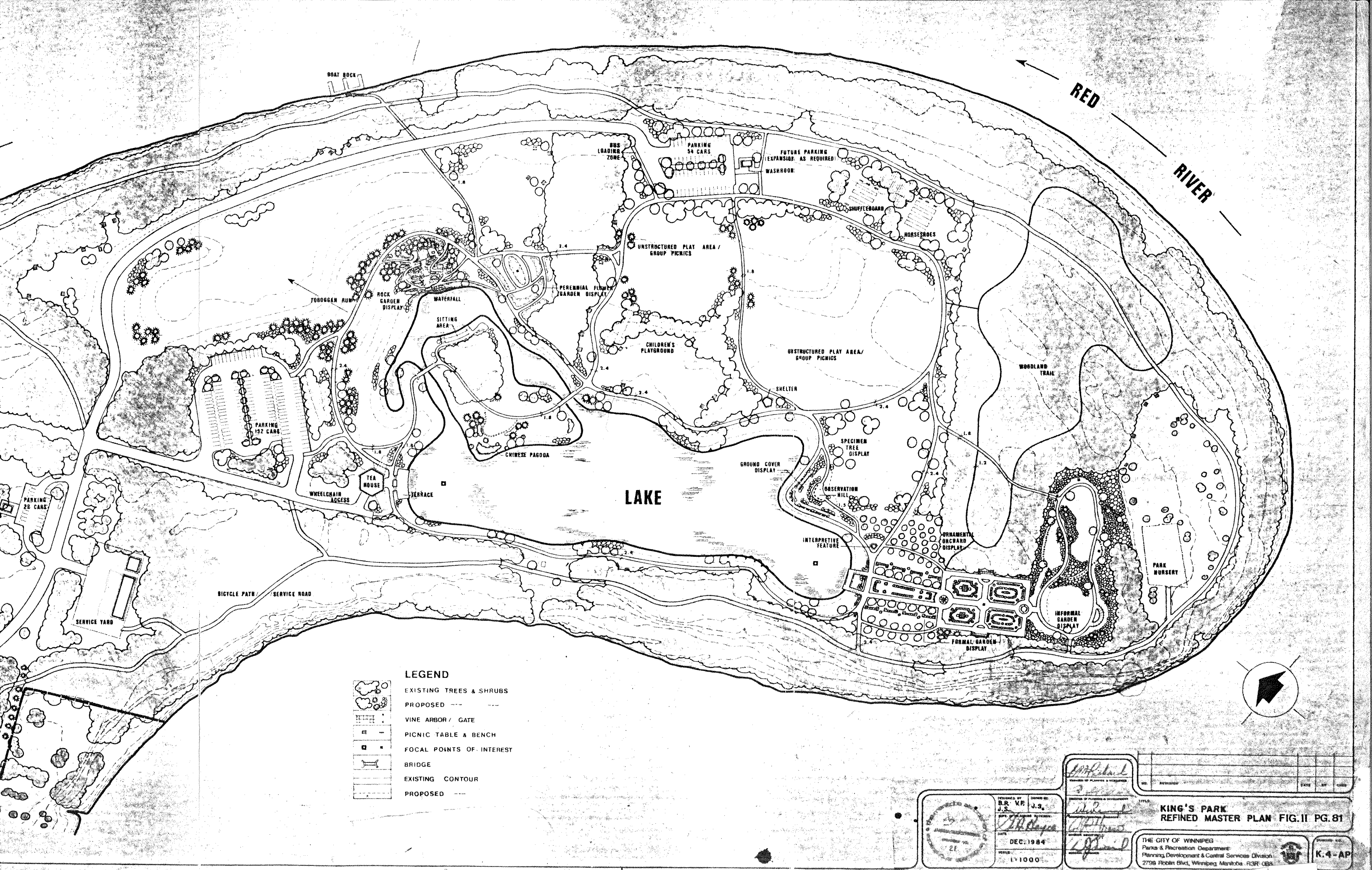
King's Park Master Plan

A master plan, figure II, for the development of the park was prepared by the City of Winnipeg's Parks and Recreation Department in 1974, with final implementation set for 1988. The Existing Site Plan, figure III, contains the following components;

- 1) one football/soccer field
- 2) one baseball diamond
- 3) one fastball diamond
- 4) perimeter bicycle/foot path
- 5) 132 and 22 car parking lots
- 6) hill
- 7) waterfall and rock garden display
- 8) lake (app. 2400 square metres)
- 9) chinese pagoda
- 10) two foot bridges
- 11) washrooms
- 12) small tree nursery
- 13) pump house for lake
- 14) service yard
- 15) small field
- 16) wet field
- 17) large field
- 18) woods
- 19) riverbank

Components not yet completed include:

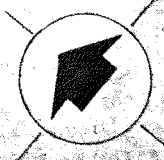
- 1) additional washrooms
- 2) tea house restaurant
- 3) lake shore terrace
- 4) shelter structure
- 5) topiary/parterre garden
- 6) formal flower garden
- 7) informal garden
- 8) perennial flower display area
- 9) ground cover display area
- 10) specimen tree display area
- 11) ornamental orchard display area
- 12) observation hill with sundial sculpture
- 13) woodland trail
- 14) 54 car parking lot plus area for expansion



RED RIVER

LAKE

- LEGEND**
- EXISTING TREES & SHRUBS
 - PROPOSED
 - VINE ARBOR / GATE
 - PICNIC TABLE & BENCH
 - FOCAL POINTS OF INTEREST
 - BRIDGE
 - EXISTING CONTOUR
 - PROPOSED

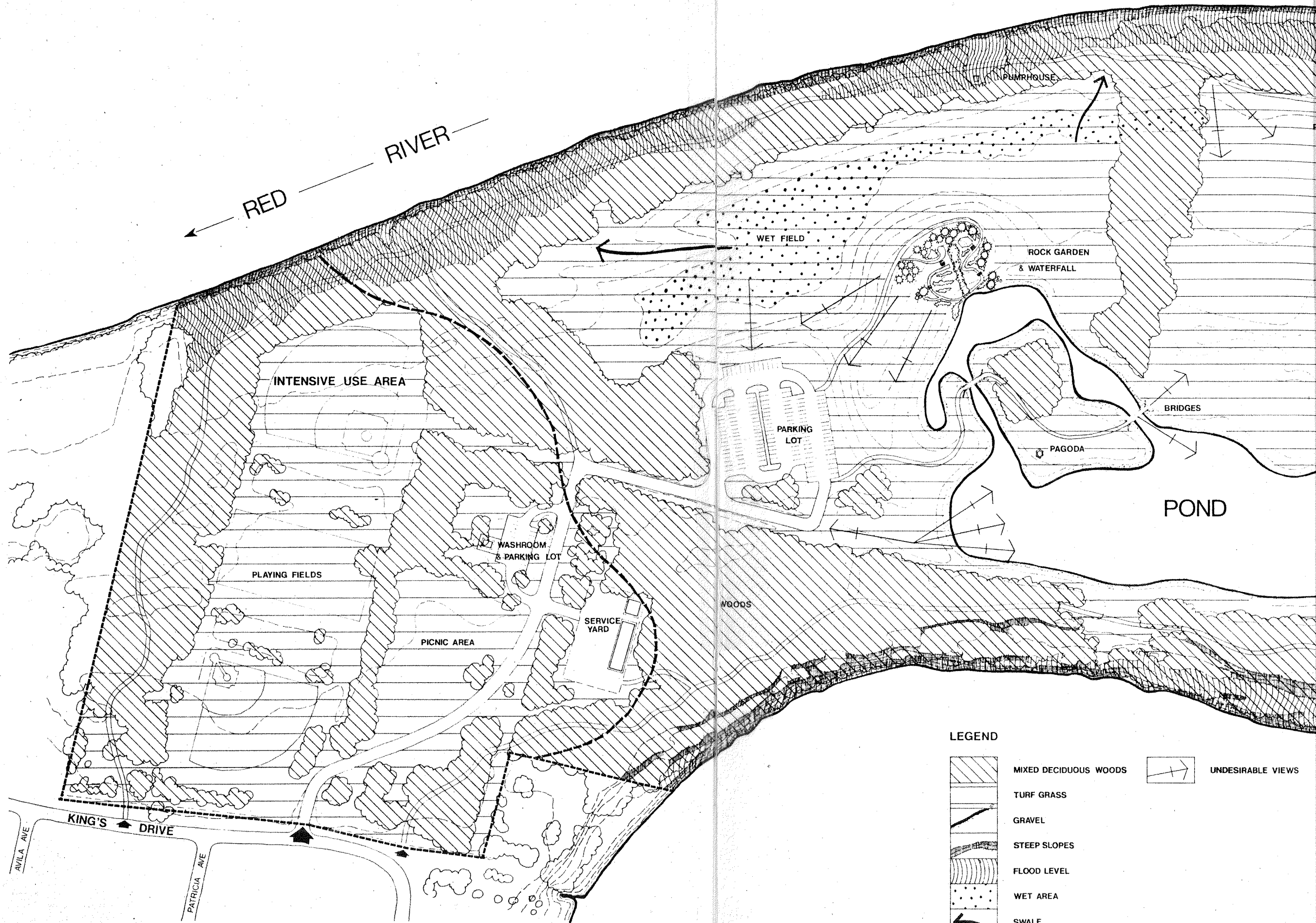


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 DRAWN BY: J.S.
 DATE: DEC. 1984
 SCALE: 1" = 100'

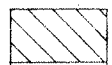

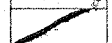


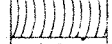

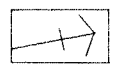
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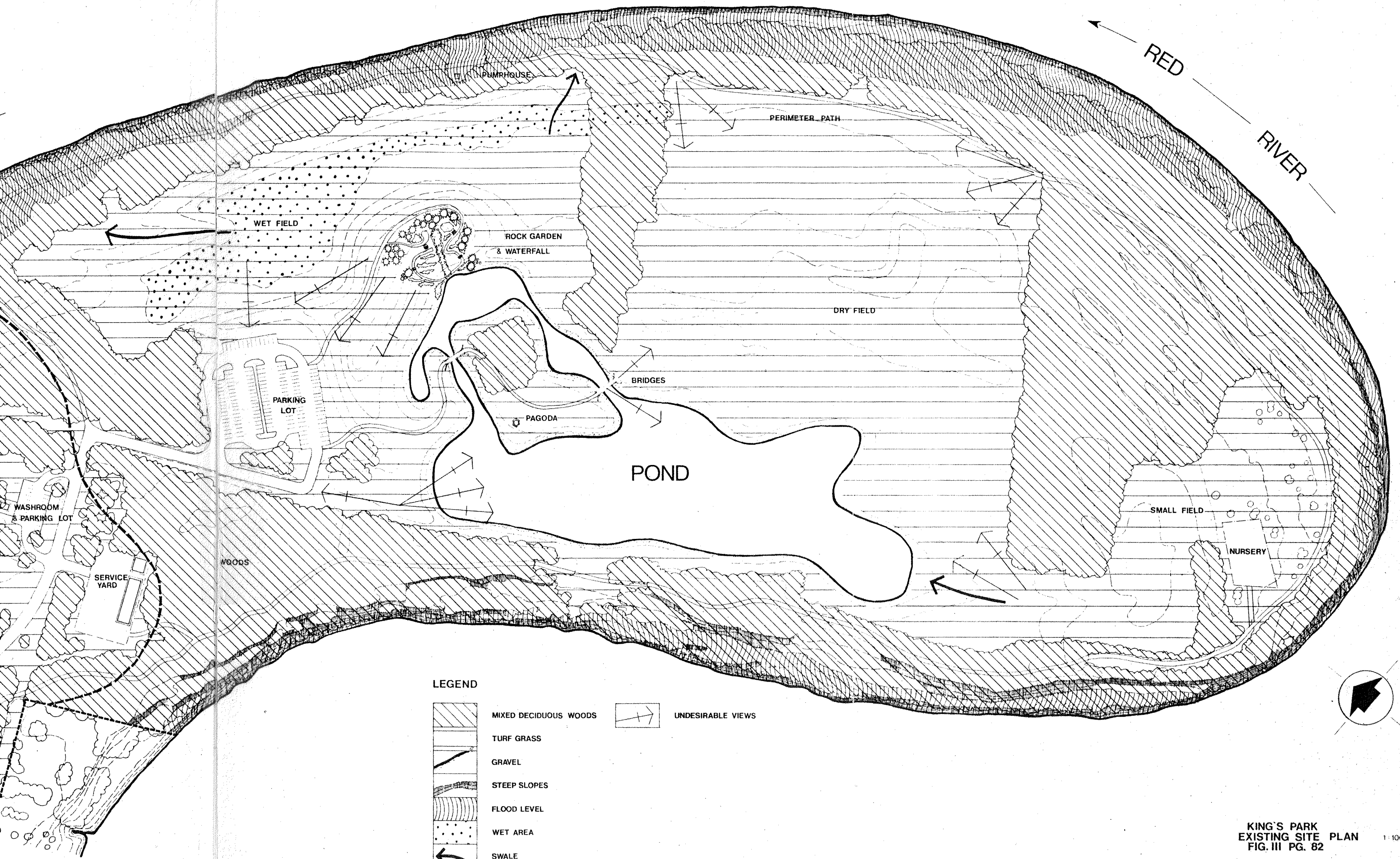
KING'S PARK
REFINED MASTER PLAN FIG. II PG. 81
 THE CITY OF WINNIPEG
 Parks & Recreation Department
 Planning, Development & Central Services Division
 2798 Roblin Blvd, Winnipeg, Manitoba R3R 0B8

K.4-AP



LEGEND

-  MIXED DECIDUOUS WOODS
-  TURF GRASS
-  GRAVEL
-  STEEP SLOPES
-  FLOOD LEVEL
-  WET AREA
-  SWALE
-  UNDESIRABLE VIEWS



RED RIVER

PUMPHOUSE

PERIMETER PATH

WET FIELD

ROCK GARDEN & WATERFALL

DRY FIELD

PARKING LOT

BRIDGES

PAGODA

POND

SMALL FIELD

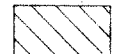
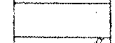





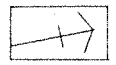
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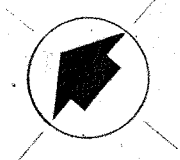
WOODS

WASHROOM & PARKING LOT

SERVICE YARD

LEGEND

-  MIXED DECIDUOUS WOODS
-  TURF GRASS
-  GRAVEL
-  STEEP SLOPES
-  FLOOD LEVEL
-  WET AREA
-  SWALE
-  UNDESIRABLE VIEWS



87
21
605
2/15

- 15) children's playground
- 16) unstructured play/picnic area
- 17) horseshoe and shuffleboard pits
- 18) tobogan run
- 19) boat dock on Red River
- 20) all connected by app. 2km of new pathway

The master plan shows the relative size and position of these features within the park. While features such as the sports fields and perimeter path serve obvious functions, the rationale for the variety of landscape styles is less clear. Personal discussions with the landscape architect responsible for design did not provide reasons for such items as the orchard display, Chinese pagoda and tea house, topiary gardens or specimen tree area, to mention a few in discussion. The design of the Park appears to embrace the conscious juxtaposition of divergent styles and forms with little or no thought as to how best connect the spaces visually or functionally. The major features, the observation hill, water terrace, tea house, waterfall rockgarden and Chinese pagoda, centre around the water's edge, apparently focusing inward and across to each other. Little thought appears to have been given to the riverbank, the lake edge or the interior forest edges regarding the actual or potential ecological character. The proposed woodland trail reflects more of an attempt to fill available space rather than for positive interaction with the forest. Additionally,

the siting of new parking lots, horseshoe and shuffleboard pits and new pathways appear arbitrary and poorly chosen. Many of the added pathways duplicate existing ones or divide much of the remaining open space. An explanation given for the overall plan was "to allow the public to view various landscape styles for the purpose of personal application or increased understanding". From discussions, it was clear that no survey or study had been undertaken to determine neighbourhood needs or desires or to emphasize the regional character of the site.

Plan Winnipeg Concerns

Regional parks are identified by Plan Winnipeg (1981) as representing two types of open space; 1) those that preserve unique landscapes and 2) those that provide major activities and attractions ie. a zoo, outdoor theatre or a specific sports complex. Further to site selection is the recommendation that all large woodland areas and wooded riverbanks should be considered for development as nature-oriented regional parks. Site use standards for a nature-oriented park include suitable recreational activities such as cross country skiing, hiking, and nature interpretation. The standards set by Plan Winnipeg for regional park design suggest a need for reevaluation of the present design

program for King's Park. General comments from the public sector regarding park activities and functions are listed in Appendix A.

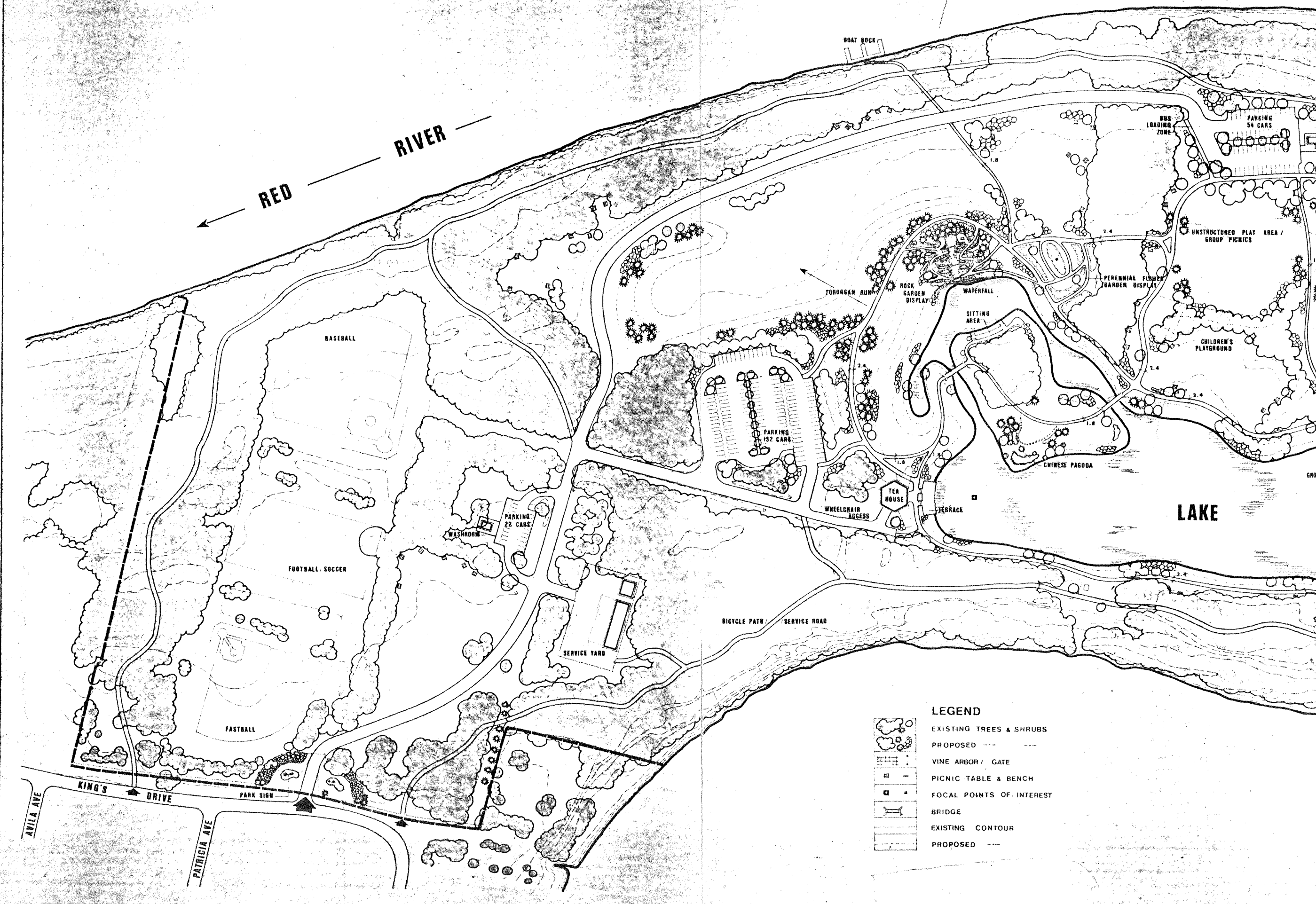
Existing Component Analysis

The components present in the Existing Site Plan have been rated according to Ecological Design Principles to produce a Degree of Fit Matrix, figure IV. The range varies from a high degree of fit of +3, to a low degree of fit of -3. Zero represents a neutral degree of fit. Totals for the individual components have been ranked to produce a Degree of Fit Plan, figure V. The ranking is divided into a low degree of fit (-18 to -10), a moderate degree of fit (-9 to +9) and a high degree of fit (+10 to +18). The plan also includes the ecological principles of primary and secondary succession and identifies the landscape as either static or dynamic. Static landscapes are those that, due to maintenance, change very little. Dynamic landscapes are those that are allowed to change due to ecological processes and are influenced little by maintenance. The plan reveals that features sited on Secondary Succession zones are static landscapes with a low degree of fit to Ecological Design Principles. Those features on Primary Succession zones are

component	Ecological Structures Present	Ecological Stability	Ecological Diversity	Is Nature Preserved +/- Destroyed	Ecological Process Present	Management +/- Maintenance Required	Total
football field	-2	-3	-3	-3	-3	-2	-16
baseball diamond	-3	-3	-3	-3	-3	-3	-18
fastball diamond	-3	-3	-3	-3	-3	-3	-18
132 car lot	-3	-3	-3	-3	-3	-3	-18
bike/foot path	-1	-1	-2	-1	-2	-1	-7
22 car lot	-3	-3	-3	-3	-3	-1	-16
washrooms	-3	-3	-3	-3	-3	-2	-17
hill	-3	-3	-3	-3	-3	-3	-18
waterfall	-3	-3	-3	-3	-3	-3	-18
rock garden	0	0	0	-3	-2	-3	-8
lake	-1	-1	-2	-2	-2	-1	-9
Chinese pagoda	-3	-3	-3	-2	-3	-3	-17
bridge	-3	-3	-3	0	-3	-1	-13
pumphouse	-3	-3	-3	-2	-3	-3	-17
small field	-2	-2	-3	-3	-3	-2	-15
wet field	-2	-2	-3	-3	-2	-2	-14
dry field	-2	-2	-3	-3	-3	-3	-16
woods	-3	-3	-3	-3	-3	-3	-18
tree nursery	-3	-3	-2	-3	-3	-3	-17
service yard	-3	-3	-3	-3	-3	-3	-18
riverbank	3	3	3	3	3	3	18

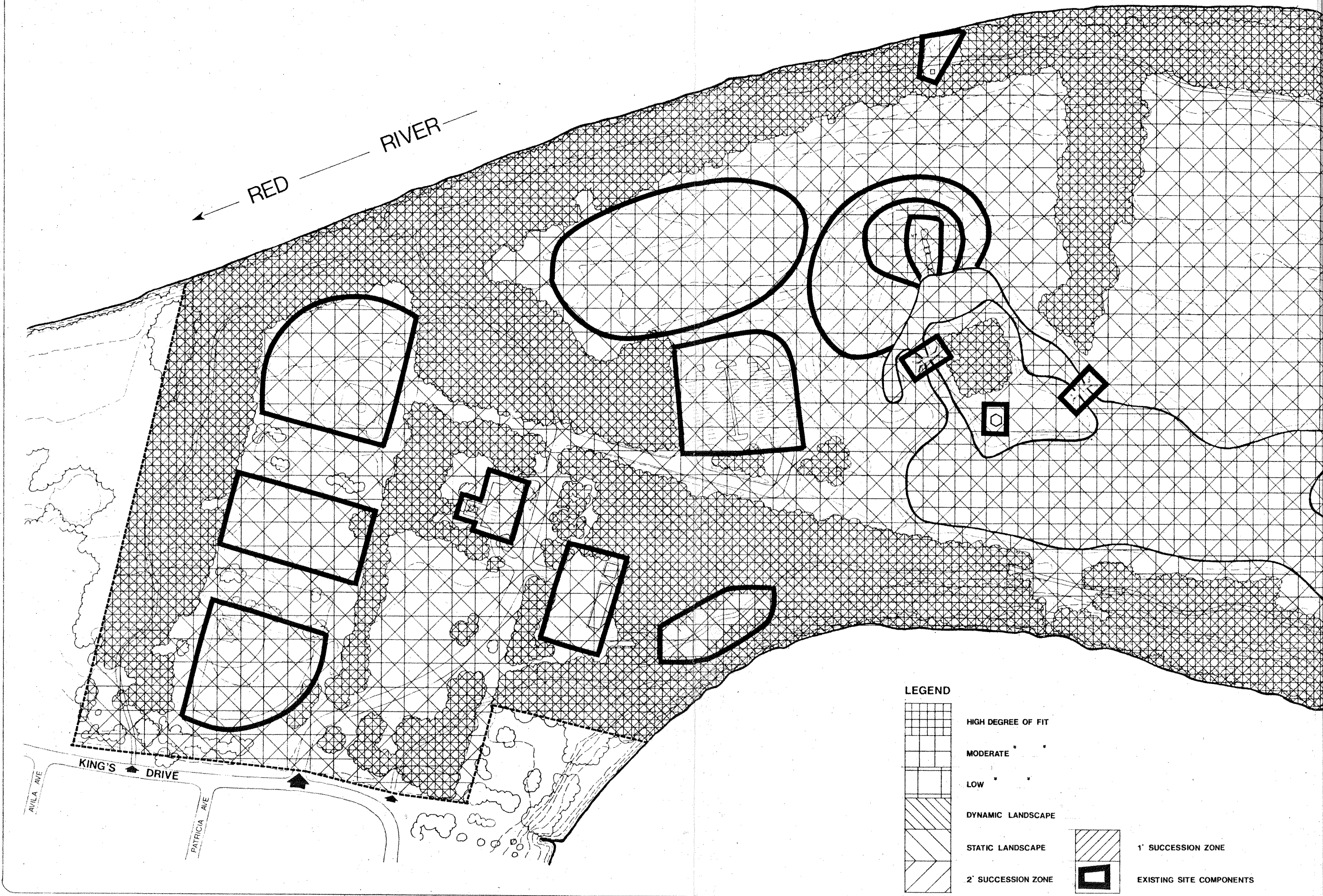
Figure IV Degree of Fit Matrix

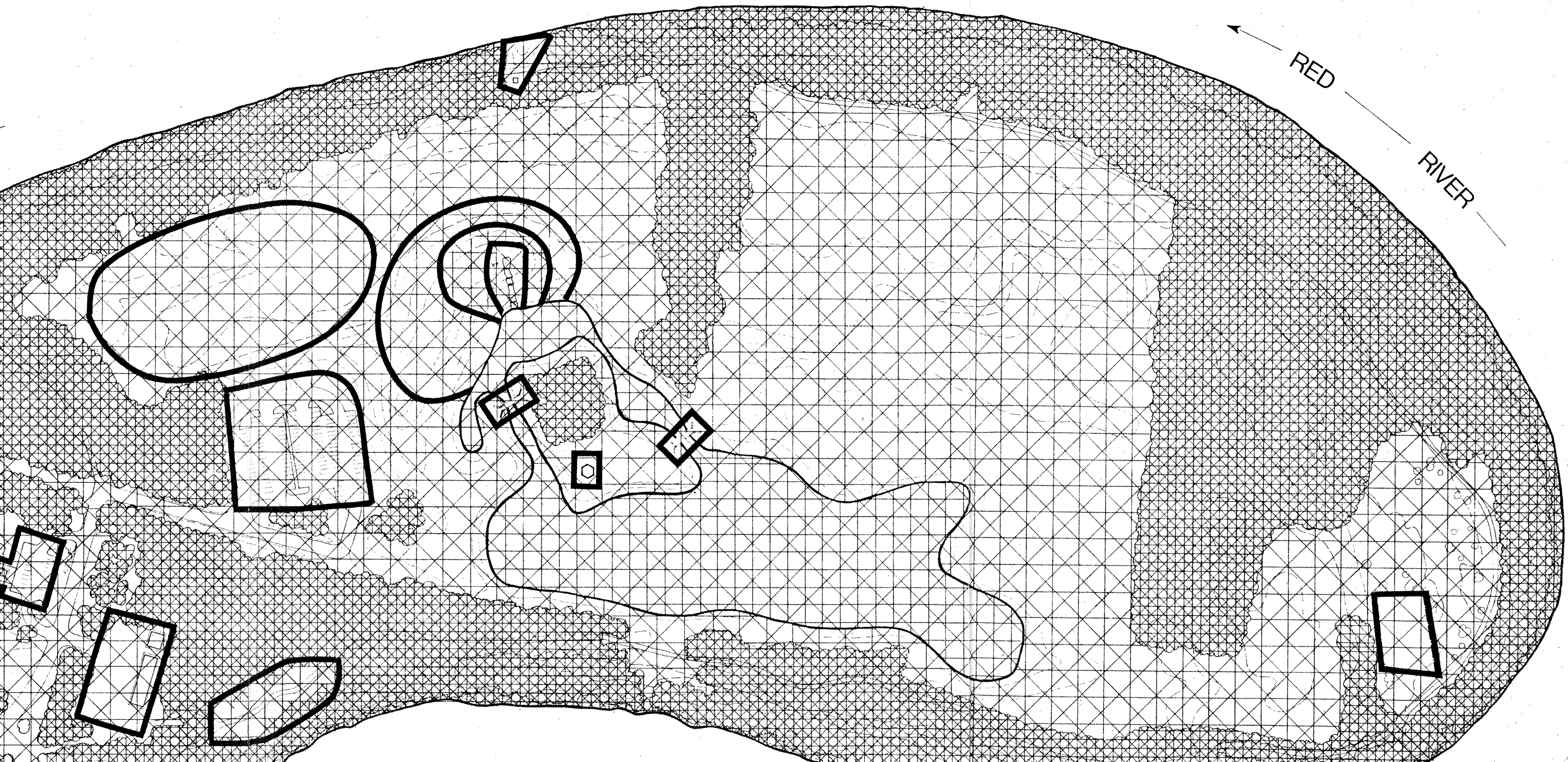
Degree of Fit of Existing Site Components Based on Ecological Design Principles. Range from a high of +3 to a low of -3.



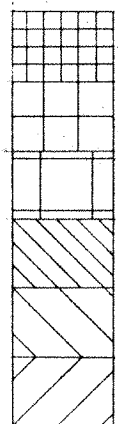
LEGEND

- EXISTING TREES & SHRUBS
- PROPOSED
- VINE ARBOR / GATE
- PICNIC TABLE & BENCH
- FOCAL POINTS OF INTEREST
- BRIDGE
- EXISTING CONTOUR
- PROPOSED





LEGEND



HIGH DEGREE OF FIT

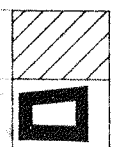
MODERATE

LOW

DYNAMIC LANDSCAPE

STATIC LANDSCAPE

2' SUCCESSION ZONE



1' SUCCESSION ZONE

EXISTING SITE COMPONENTS

KING'S PARK
DEGREE OF FIT PLAN
FIG. V PG. 87

1:1000

identified as dynamic landscapes with high degrees of fit.

The Degree of Fit plan reveals how the highly maintained landscape of the urban park begins to move further and further away from the natural processes embodied within ecological principles.

While the Degree of Fit plan reveals component relationships to the site based on ecological design principles, the justification for the retention or the modification of these components requires further analysis. The additional analysis is based on such factors as operations and maintenance costs (O & M); initial capital costs; Plan Winnipeg concerns; political acceptability; site disruption and community use, figure VI. The analysis reviews in annotated form how the existing features can be affected by the preceding factors. This will determine which components can be modified and to what degree. Further comments on the analysis can be found in Appendix B.

The Degree of Fit Plan demonstrates that not all existing components have a high degree of fit to the site based on Ecological Design Principles. The Modification Potential of these non-ecological

Component	O & M Costs	Initial Capital Cost	Plan Winnipeg Concerns	Public Use	Political Acceptance	Site Disruption	Modification Potential
football field	high	high	ecological concerns higher than recreation	high	high	mod.	low due high use
baseball field	"	"	"	"	"	"	"
fastball field	"	"	"	"	"	"	"
parking lot	low	mod.	conforms to P.W. concerns	"	"	high	low due to capital cost, disruption & public use
bike/foot path	mod.	high	"	"	"	mod/high	low due to high use
washrooms	"	"	does not conform to P.W. concerns	"	"	low	low due to use & capital cost
hill	low	"	"	low	"	high	low due to disruption, capital cost, political unacceptability
rock garden	high	"	"	low/mod	mod.	mod.	mod/high potential due to mod. disruption & P.W. unacceptability
waterfall	mod.	"	"	low	"	low	"
lake	high	"	"	"	high	"	low modification to remove lake, high modification to adopt ecological principles
pagoda	low/mod.	mod.	"	"	mod.	"	high potential given disruption, low use & poor P.W. relationship
bridge	low	high	conforms to P.W. concerns.	"	low	"	mod. potential due to high capital cost and questionable need on site
pumphouse	mod.	mod.	artificial water creation not a P.W. concern	related to water use on site	high	"	low potential if water is maintained on site
woods	low	high	retaining woods conforms with P.W. concerns	high	"	low/high	low potential given the use and replacement costs
fields	"	mod/high	does not conform to with P.W. concerns	low	mod.	low	high potential due to O & M savings, low disruption & poor P.W. relationship
riverbank	"	high	conforms with P.W. concerns	high	high	high	low potential given use and P.W. concerns
tree nursery	mod.	low	does not conform with P.W. concerns	low	low	low	high potential due to low disruption & poor P.W. relationship
service yard	low	high	does not conform with P.W. but is necessary for maintenance and management functions	"	high	high	low potential due to present & future maintenance needs

Figure VI

Degree of Fit Analysis

components further indicates to what degree these existing features can be adapted to fit with Ecological Design Principles. The next stage in developing a conceptual plan involves creating a vocabulary of structural design components based on ecological principles.

Ecological Design Components

Plants are a basic design component for the landscape architect. In this study, plants are the primary form determinants. The type of plant community influences animal and abiotic relationships. Primary Ecological Components consist of biotic and abiotic elements that the Author recognizes as basic building blocks of the ecosystem. These include sunlight, air, water, soil, plants, animals and man. Plants, in combination with various physical factors such as topography and aspect, then form Primary Structural Components, Figure VII. These are divided into terrestrial and aquatic components.

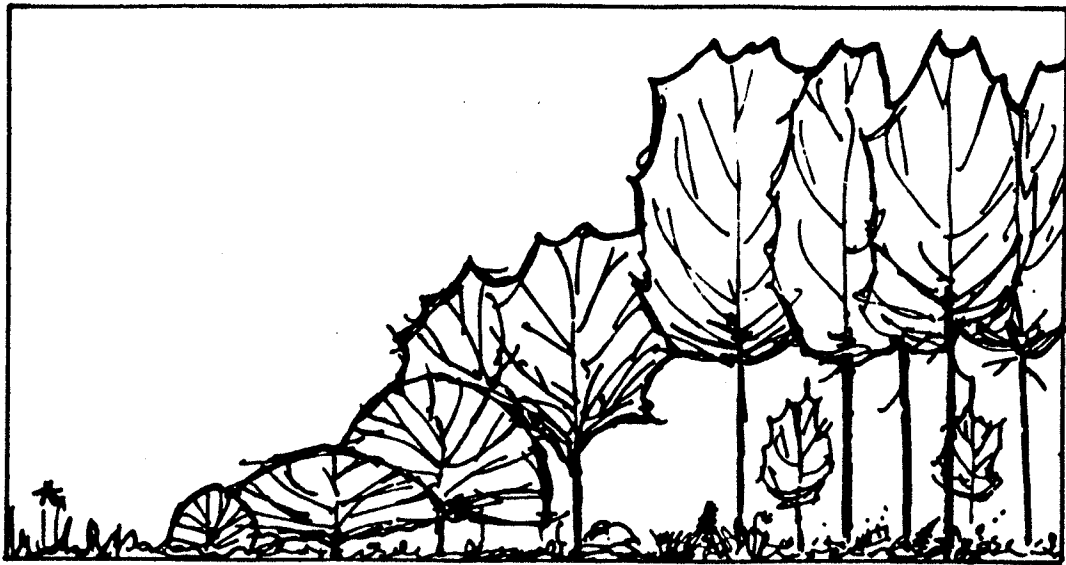
Terrestrial

canopy trees
understory trees
tall shrubs
low shrubs
grasses/forbes
groundcovers

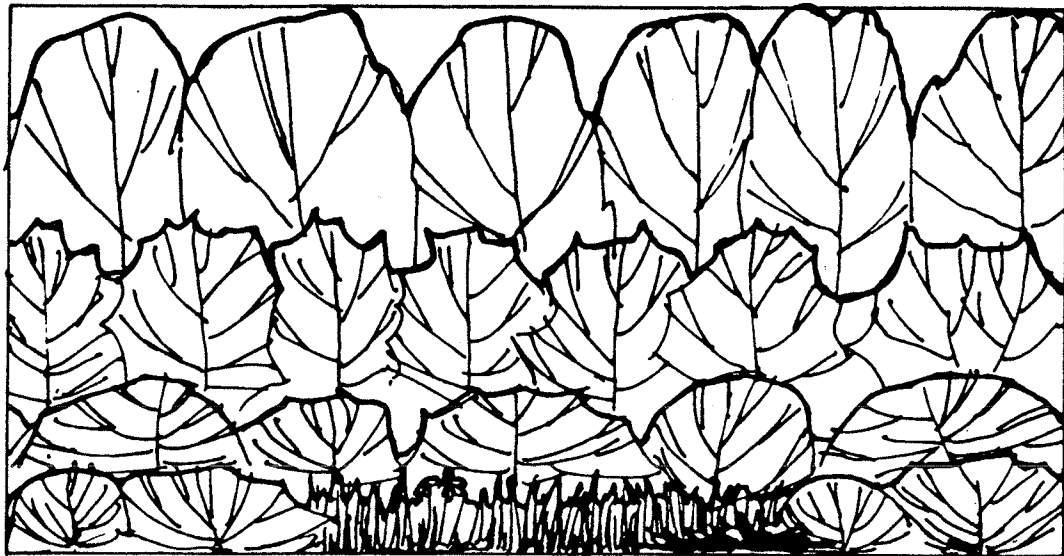
Aquatic

submerged plants
floating plants
emergent plants

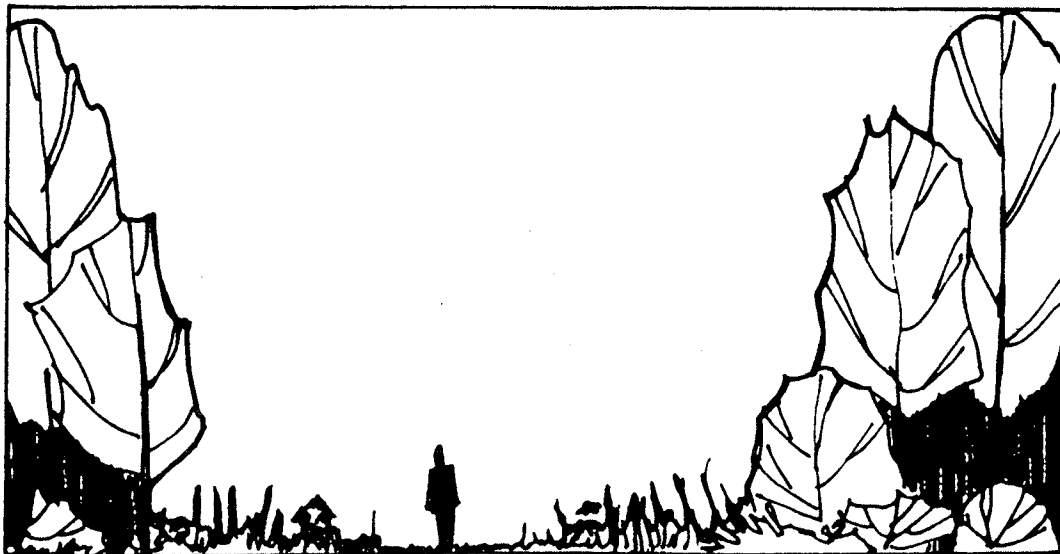
Secondary Structural Components, Figure VIII, are the communities that result from the assemblage of Primary Structural Components. These may be assembled in a variety of strata, horizontal and vertical, open and closed spaces, age structures, and ecotones. Ecotones, Figure IX, are edge zones and can be divided into three types; a) abrupt transitions between communities due to soil type or drainage, eg. between sand and loam soils; b) sharp transitions due to individual plant interactions, competition or human influence, eg. controlled burning, shading of ground and c) blending of 2 or more vegetational types, eg. meadow and forest.



Vertical Stratification

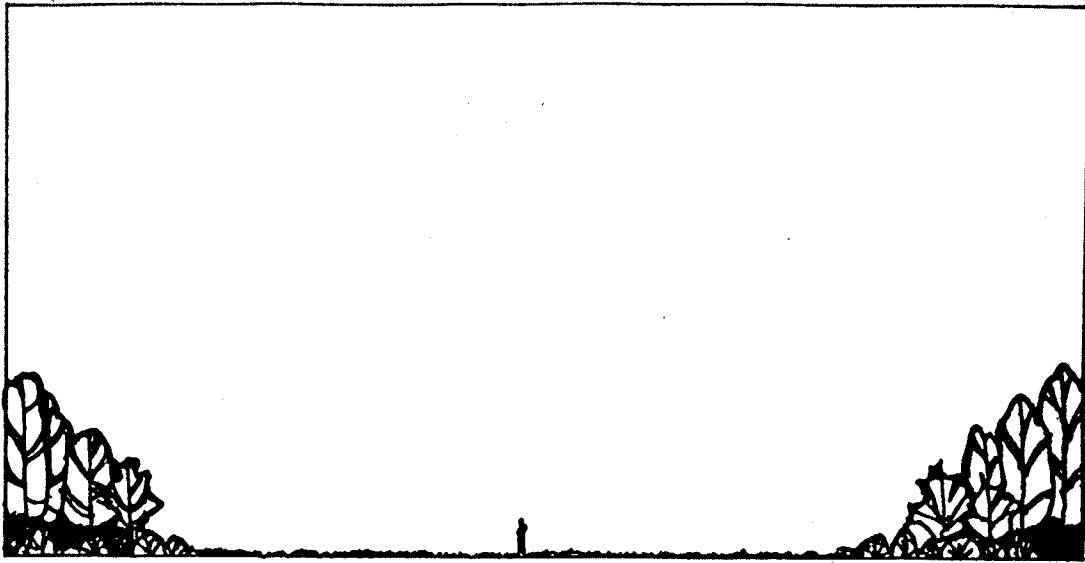


Horizontal Stratification

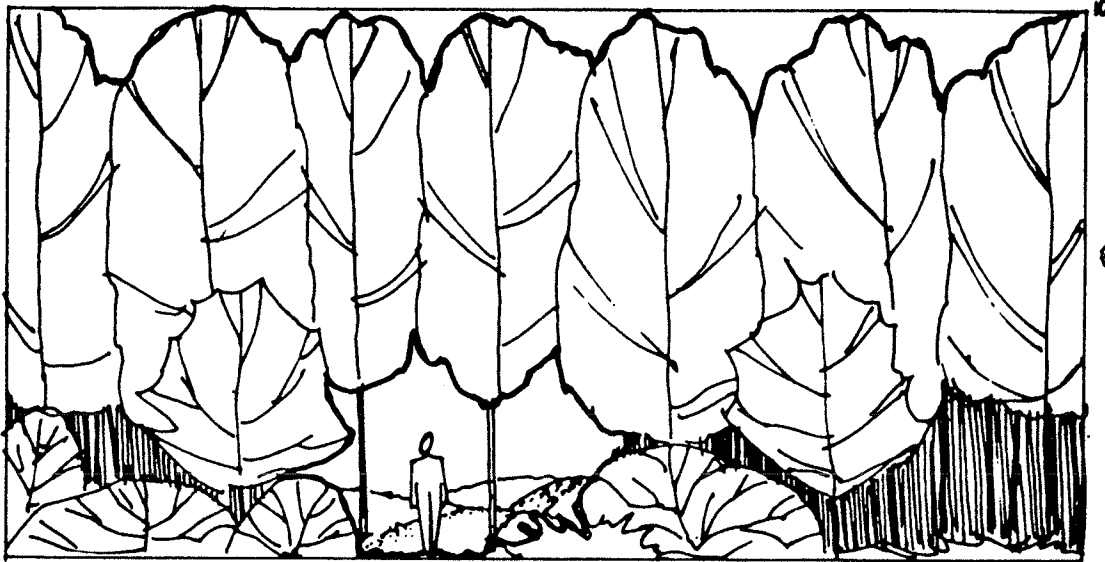


Open Space

Figure VIII
Secondary Structural Components



Open Space



Closed Space



Closed Space

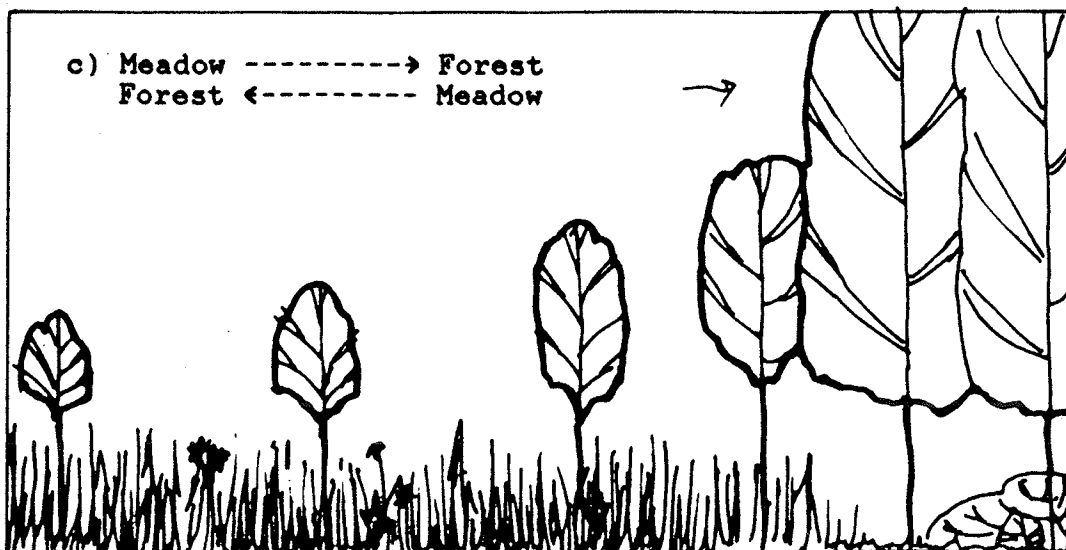
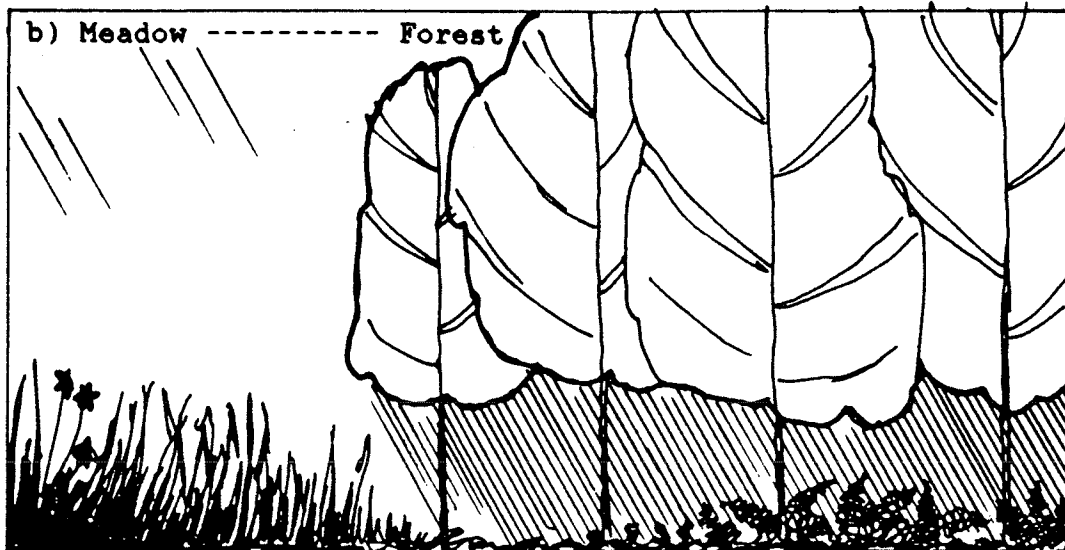
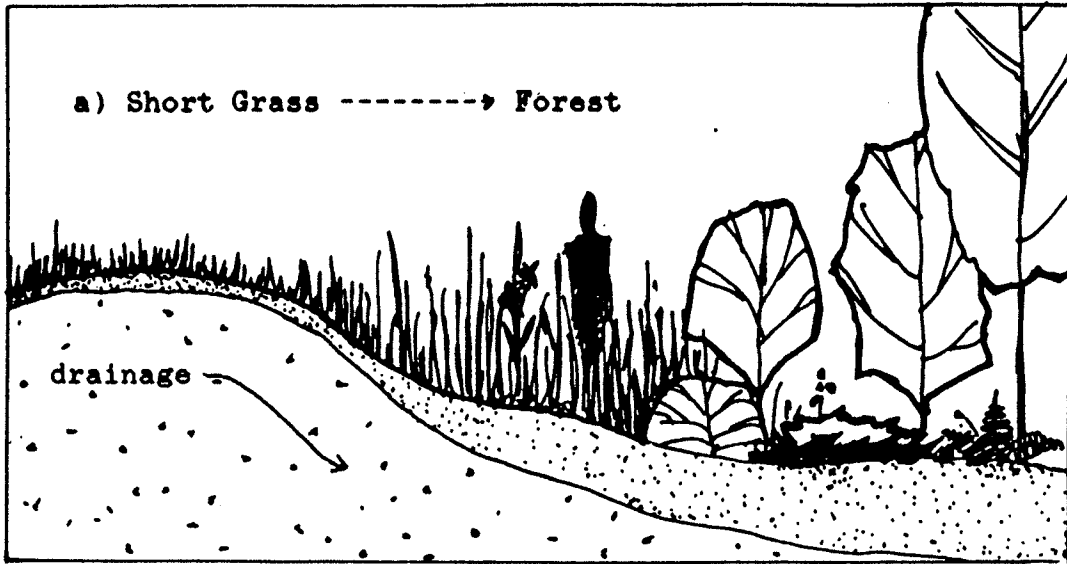


Figure IX

Ecotones

Ecological Process Plan

The Ecological Process Plan, Figure X, represents a form the site would tend to evolve toward if uninfluenced by human manipulation. Secondary Structural Components begin to develop in relationship to biotic and abiotic features of the landscape. Forest edges begin to spread into the meadows and emergent plants begin to fill the pond edges in. The process is one of succession and occurs in both desirable and undesirable directions. A positive direction is the way we view the forest as growing and enveloping a meadow, with the meadow eventually

becoming a complete forest. The recession or death of one community for the growth of another is often seen as a negative process, a meadow expanding into the forest due to fire, flood or drought. The important aspect of ecological processes is that they are cyclical in nature and grow towards steady state environments.

If the Ecological Process Plan was to continue its development unchecked by human activities the site might eventually become completely forested. The pond would gradually fill up with progressively more stable communities until it too became wooded. What is more

RED RIVER



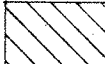




LEGEND

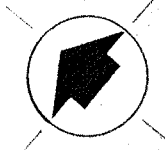
- DECIDUOUS WOODS
- ECOTONE ZONE
- TALLGRASS MEADOWS
- EMERGENT PLANTS
- AQUATIC PLANTS



RED RIVER

LEGEND

-  DECIDUOUS WOODS
-  ECOTONE ZONE
-  TALLGRASS MEADOWS
-  EMERGENT PLANTS
-  AQUATIC PLANTS



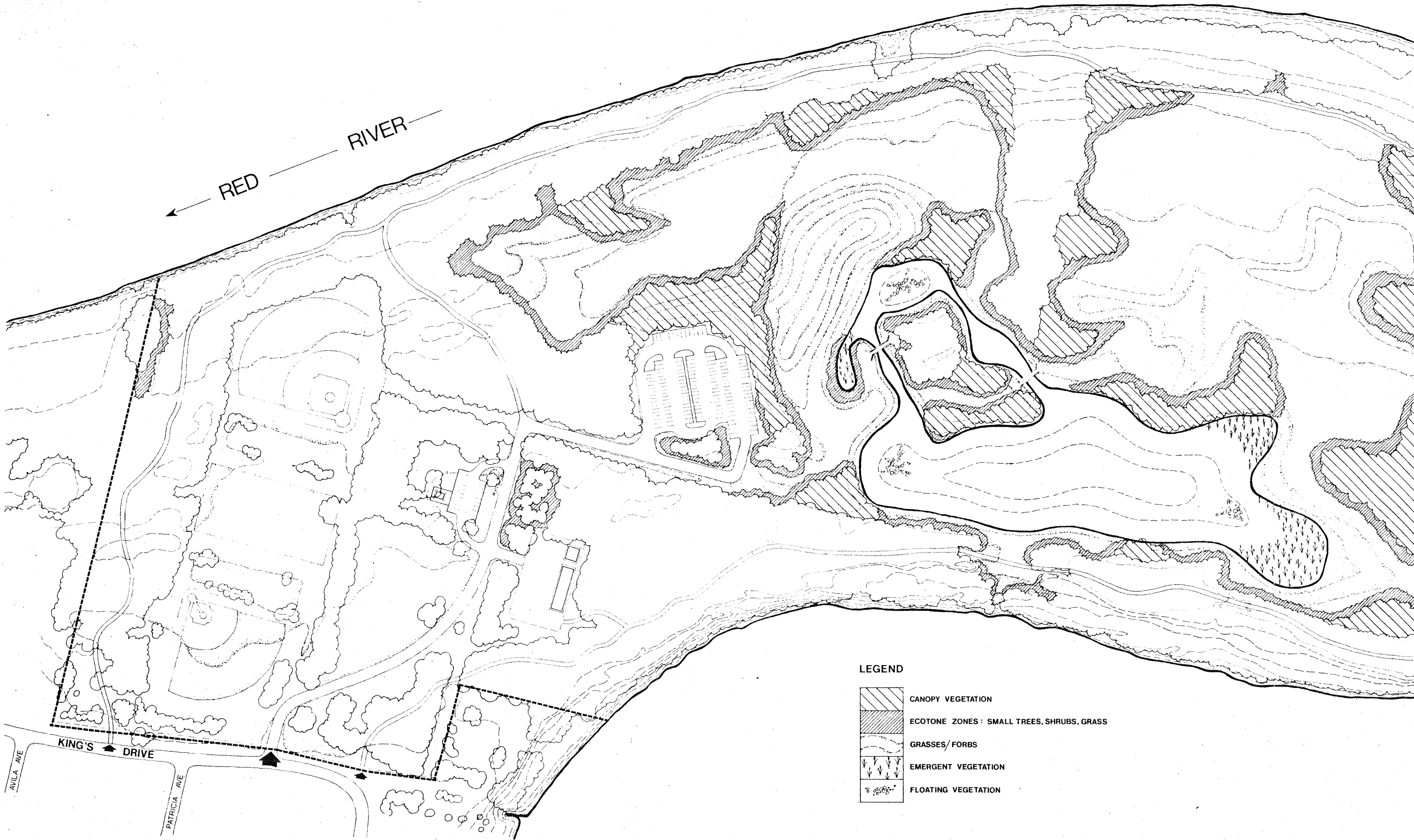
likely to occur is that some Triggering Factor would create opportunities for new communities to develop. The principle of Limiting Factors would dictate the success a community and its individual components would achieve. As these communities mature, the landscape would display various stages of growth and decay with an orderly transition between community types. An increasingly diverse, hence stable environment would result, with greater number of interrelationships occurring.

Conceptual Plan

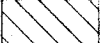




The present form of King's Park is visually related to the English School of Landscape Gardening. Traditional motifs of open fields with wooded borders, groves, the presence of a lake or river and the use of landmarks to designate sight lines all contribute to the pastoral landscape image. Highly intensive maintenance practices have produced a sharp demarcation between community types. The mowing of field and pond edges have restricted successional communities from forming. The overall result of the Park's maintenance program is a lack of cohesiveness between plant communities and space functions. The purpose of the Conceptual Plan,

figure XI, is to show the development of an ecological design from the existing framework of an urban park. The Modification Potential analysis discloses to what degree existing features may be modified to accord with ecological design principles. Established infrastructures such as the parking lots, roads, washrooms, playing fields, perimeter path, service yard, pumphouse, woods, riverbank, hill and lake have a low modification potential based on factors other than Ecological Design Principles. They could not be removed because of these factors. The hill, lake, nursery, pagoda, fields, rock garden and waterfall could be modified to fit with the ecological design principles. Secondary Structural Components applied in patterns developed from the Ecological Process Plan can begin to resolve this lack of visual and ecological continuity. The hill, fields and tree nursery could be replanted with native grasses. The lake, now recognized as the pond it is, could be allowed to develop controlled successional communities. The rock garden and waterfall could be removed and their areas be incorporated into the hill's ecological community with minimal disruption. The pagoda's inappropriateness to the site can easily be resolved with its removal.

RED RIVER








LEGEND

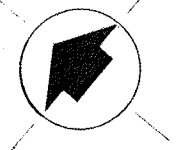
-  CANOPY VEGETATION
-  ECOTONE ZONES : SMALL TREES, SHRUBS, GRASS
-  GRASSES/FORBS
-  EMERGENT VEGETATION
-  FLOATING VEGETATION



RED RIVER

LEGEND

-  CANOPY VEGETATION
-  ECOTONE ZONES : SMALL TREES, SHRUBS, GRASS
-  GRASSES/ FORBS
-  EMERGENT VEGETATION
-  FLOATING VEGETATION



To allow the greatest variety of spaces and forms to develop, a management program should manipulate the pattern and age of communities. To rectify the lack of visual variety and ecological cohesion due to over-maintenance, several treatments could be implemented. These involve the establishment of one or several types of ecotone. Ecotones offer edge areas a greater diversity of plant and animal species and provide a variety of landscape experiences. The following examples discuss the implementation of community forms and principles on the maintained landscape.

Forest/Meadow Ecotone

The existing forest/meadow edge is maintained by mowing. This produces a sharp separation between the two communities. The management of the forest/meadow ecotone would involve removing trees or planting selected areas to ensure a variety of landscape experiences as well as age and structural diversity. Reestablishment may be as simple as allowing the forest edge to move out into the meadow or conversely, allowing the meadow to move into forest clearings. Ecological factors such as drainage, aspect or competition would determine the success of individual species as well as communities. By allowing ecological

processes to continue unimpeded, diverse and eventually stable communities would result.

Meadow/Water Ecotone

Where aquatic and terrestrial environments meet, the shoreline zone offers the potential of more than one juxtaposed plant community in. At present, the featureless shoreline lacks integration with the meadow and has no association with the forest. Little, if any, naturally occurring plant growth is allowed, a gravel and mud strip represents the water's edge. No thought was given to the use of an emergent plant ecotone along the shoreline. Given the chance ecological succession would result in the establishment of not only an emergent community, but an attractive and dynamic shoreline. The presence of water will allow terrestrial species to grow along the shore and with selective maintenance a balance between water and land can be created.

Aquatic Ecotone

The pond, though man made, can quickly reestablish ecological processes through two means. The first involves excavating the pond to a variety of levels and ensuring proper water conditions through aeration and movement. The second allows for the growth of aquatic

plant species among the various pond levels, creating diverse aquatic environments. As emergent species would gradually fill in the pond, management must ensure a balance between open and colonized water.

Individual communities - the forest, meadow or lake - will be governed by the same ecological principles as the ecotones. Each will evolve along well known successional patterns. Species success and diversity will be a result of the site's abiotic and biotic factors.

Maintenance and Management

Ecological principles should not be applied in areas of the park set aside for intensive activities, such as the sporting fields or picnic area. Maintenance determines and controls the form of the intensively used landscape. Grass is cut and trees and weeds are not allowed to grow in the middle of baseball diamonds. Playing fields are watered and fertilized. Maintenance is an ongoing process to keep the landscape at a particular level of development. It is an expensive but necessary factor.

Management of a landscape developed on ecological principles is, in the long term, less expensive and labor intensive to maintain. Initial management will be high until site disruptions have been stabilized. Diseased trees may be removed, but grass cutting or wood clearing would be carried out on three to five year schedules. The pond would be managed to ensure a proper balance between open water and encroaching plants.

Conclusion

This practicum has presented an alternative method for urban park design based not on traditional concepts and styles but rather upon ecological principles. With increasing demands upon the environment for food production, natural resources or living space, alternative methods and uses of the environment have become important. The abandonment of traditional styles is not the intention of this study, rather the modification of thinking to permit the landscape to respond to natural laws. Cost does not restrict the development of ecologically designed parks, but entrenched patterns of thought do. The same amenities can be created by using ecologically sensitive designs and traditional styles. A new set of design components

may create a visually different image, but the same physical qualities can be present. It is the matter of increasing public awareness of this potential that has to be addressed. Until new ideas are applied and shown to be successful, traditional approaches will remain as the best solutions. Apart from trying to create new and interesting landscapes, ecological designs also raise the issue of preserving original land types for future generations. The conceptual plan offers the urban resident the opportunity to experience nature on its own terms, rather than on preconceived or erroneous constructions of man. The ecological park, while providing aesthetic and educational potential to the urban population, also provides philosophical satisfaction and a place for nature in the city.

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Appendix A

Plan Winnipeg Concerns

- 1) Need more natural green space for exploration by young and old instead of tot-lot ideas. Might even be cheaper.
- 2) There is not enough fun and learning 'stuff' in playground areas and school yards.
- 3) The population has changed; we may not need more parks but rather different parks.
- 4) There is over maintenance in some areas; frogs and tall grass are appreciated too
- 5) Parks are overly manicured. There are not enough 'natural' treatments. It would be a cost saving.
- 6) Flat green areas show a lack of creative design. There is a need for more stimulating and creative environments.
- 7) The vegetation selected for park planting should be of native varieties.
- 8) The standardization of parks and recreation space and facilities leads to blandness and sameness of image throughout the city.
- 9) The design and programming of parks must provide for a greater variety of experiences, activities and feelings.

- 10) Storm drainage ponds need to be more creatively designed to encourage better use. Fish and vegetation could be used to aid in keeping water quality up.
- 11) Some natural areas in the city need to be retained to allow people of all ages to study nature more closely. Educational programs could be set up to appreciate nature.
- 12) Different types of 'natural areas' need to be retained or developed (my underline) with an attached or related interpretative centre on hand.
- 13) The city of Winnipeg should recognize that an open space system may provide a structure and image for Winnipeg both now and one hundred years from now and that the system may be valid throughout and beyond this time period.
- 14) As a means of offering different physical and visually appearing environments, each major park or facility complex should be designed around different themes. The only limitation to the variety of themes and their execution is the creative ability of the park designer and the citizens working with him.
- 15) As a means of offering different physical and visually appearing environments each park should offer a different density or intensity of use from other parks and within that park. These densities of use

should be viewed as occurring over a range of images from intensively urban to wilderness.

16) Open space should be used for the preservation of natural landscapes for nature-related activities and outdoor classroom use.

Appendix B

Football field analysis:

- There would be an eventual O & M saving due to reduced mowing, if the field was removed.
- Site disruption would be moderate if the football field was modified.
- The initial capital cost inhibits the removal of the field.
- Plan Winnipeg places ecological preservation over recreation.
- Political acceptability for retaining the football field given the urban area and high community use.
- Modification Potential is low given the high use demand and initial capital expenditure.

Baseball field analysis: Due to the similiarity of the baseball and fastball fields to the football field, the above analysis and modification potential apply to all three.

Parking Lot analysis:

- A small O & M saving could be recognized with the removal of the parking lots.

- The initial capital cost inhibits the removal of the parking lots.
- Plan Winnipeg concerns do not address the problem of access to parks.
- Due to the high capital investment and public reliance on vehicles, removal of parking lots would be politically unacceptable.
- Site disruption would be high with the removal of any parking lot.

Modification Potential is low for the parking lots given the high capital investment, site disruption and the public reliance on vehicular travel.

Bike/Foot Path analysis:

- O & M costs are low for the pathway making their removal unlikely.
- Initial capital cost for the path is high thereby reducing modification potential.
- The pathway system creates access to the natural environment of the park and supplies recreation corridors for summer and winter activities, all of which are concerns of Plan Winnipeg.
- Due to the demand for outdoor recreation by the public, political acceptability is high for the retention of such a path system.

- The removal of the pathway would initially cause major site disruption, though ecological processes would eventually reestablish a stable environment.

- High use of the perimeter pathway system indicates its community value. Modification should be low to preserve its use.

Modification Potential: Modification potential is low for the pathway given its high use and relationship to the natural character of the site. The function of the path in allowing interaction with the landscape is of prime importance for site interpretation.

Washroom Analysis:

- Moderate O & M costs are to be found in any built structure on site. The removal of any said structure would save those costs.

- Capital installation costs are high and the removal of the structure would require strong justification.

- Given the Regional Park designation of the site, modification of washroom facilities would be low.

- Given their existence and obvious importance to users of the recreation fields, the political acceptability is high for the retention of the washrooms.

- Site disruption would be low and short-term if the washroom were removed.

- Community use during peak recreation seasons is high, indicating a low modification potential.

Modification Potential: The public use of and high capital costs would limit modifications to the washroom.

Hill Analysis:

- The presence of the hill has little affect upon O & M savings. The hill is predominantly turf and requires less cutting than the surrounding fields due to its drainage conditions.

- The initial capital costs of the hill would have been moderate with the fill coming from the lake excavation.

- In preserving natural landscapes for environmental parks the addition of a landform feature unrelated to the site produces a conflict with Plan Winnipeg concerns.

- The cost necessary to remove the hill would be politically unacceptable.

- The removal of the hill would initially cause high site disruption.

- Community use of the hill is limited to those taking the pathway to the rock garden. Circulation is limited to between the parking lot and the rock garden.

Modification Potential: Given the high capital cost, site disruption potential, political unacceptability and insignificant O & M savings, the potential for modifying the hill is low.

Rock Garden Analysis:

- The horticultural aspect of the rock garden requires a high degree of maintenance and material input. Removal or reduction would produce an O & M saving.

- Capital cost would be high for the rock garden indicating a low modification potential.

- The horticultural nature of the rock garden conflicts with the Plan Winnipeg concern to maintain sites as natural as possible.

- Public demand for the rock garden may create political acceptability to retain the garden.

- The removal of the rock garden would create moderate site disruption.

- Community use of the garden is moderate to low.

Modification Potential: Moderate site disruption, decreased O & M costs and unsuitability to Plan

Winnipeg concerns would indicate a moderate to high modification potential.

Waterfall Analysis:

- The absence of a waterfall would produce an O & M savings.
- Capital cost would be moderately high and reduce modification potential.
- The addition of a feature counter to Plan Winnipeg concerns for an ecological park increases the modification potential of the waterfall.
- Given the attraction of water to the public, removal of the waterfall may be politically unacceptable. The presence of a large body of water would reduce that argument somewhat.
- Site disruption would be minimal and reintegration with the site short-term.
- Community use is limited due to size and layout of the waterfall.

Modification Potential: The potential O & M saving, the unsuitability of the feature to the ecology of the site, and low site disruption indicate a moderate to high modification potential.

Lake Analysis:

- Modification of the lake along ecological principles would decrease O & M costs.
- Capital cost of the lake was high resulting in a low potential for modification.
- As the lake is designed and maintained it is contrary to Plan Winnipeg concerns for ecological landscapes.
- The filling in of the lake is politically unacceptable due to the cost and public attraction for water features. Modifications based on ecological principles would answer Plan Winnipeg concerns.
- Modification of the lake along ecological principles would create little if any site disruption.
- Community use of the lake is present though interaction with the feature is limited to walking around it.

Modification Potential: Due to the cost of filling the lake, modification is low.

Chinese Pagoda Analysis:

- O & M would not have to consider repairing and painting the pagoda if it was not present.
- Capital cost was low. The pagoda originally comes from another park and was transferred to King's Park.
- Serves no active function within Plan Winnipeg concerns. Would not be missed.

- Hard to determine its political acceptability. Undoubtedly some people would demand its placement in the park as well as its removal.
- Site disruption would be minimal. No one may even miss it.
- Community use seems to be relegated to graffiti artists and pigeons.

Modification Potential: Given the low site disruption, poor relationship to Plan Winnipeg concerns and the low community use, modification potential for the pagoda is high.

Bridge Analysis:

- The absence of the bridges would produce only a small O & M saving.
- Initial capital cost would be high.
- Given the high capital cost of the bridges, their removal may be politically unacceptable
- Site disruption would be minimal.
- The bridges serve to link the opposite sides of the lake via the island. They are required for this to be possible but perhaps are not necessary.

Modification Potential: The modification potential for the bridges is moderate. This is due to their high

capital cost against the perhaps unnecessary function simply moving people to the other side of the lake.

Pumphouse Analysis:

- O & M cost is moderate.
- Capital cost is moderately high.
- Political acceptability is related to the question of whether or not the waterfall continues to flow and the lake remains full of water.
- Site disruption would be minimal.
- Community use is related to the pumphouse's function in filling the lake and running the waterfall.

Modification Potential: The necessity of the pumphouse to fill the lake and run the waterfall results in a low modification potential. The waterfall may be shut off but evaporation rates require that the lake be constantly refilled.

Field Analysis:

- Modifying the fields along ecological principles would reduce O & M costs.
- Capital costs for the fields was moderate to high. This was related to whether sod or seed was used in establishing turf.

- The establishment and maintenance of introduced turf species is contrary to Plan Winnipeg concerns for an ecological park.
- Site disruption would be minimal.
- Community use of the fields appears to be limited to the walking of dogs.

Modification Potential: The potential for modification of the fields is high given the minimal site disruption, reduced maintenance costs and the contrary Plan Winnipeg concerns.

Woods Analysis:

- Existing O & M costs are low. Management of Dutch Elm disease is the only major maintenance item.
- Capital costs would be very high to replace the woods.
- The retention of the woods follows Plan Winnipeg concerns.
- The removal of the woods would probably be viewed as politically unacceptable given public demand for trees.
- Depending upon location, modification of the woods could result in high to low disruption.
- One of the zones most used by the public.

Modification Potential: The woods high replacement cost and high public use dictates a low modification potential.

Tree Nursery Analysis:

- Removal of the nursery would increase O & M savings.
- The small size of the nursery and its limited stock would indicate a low capital cost.
- The growing of horticultural species is contrary to Plan Winnipeg concerns for an ecological park.
- Insignificant political concern.
- Minimal site disruption with the removal of the nursery.
- No community use, designated off-limits.

Modification Potential: Due to the low amount of stock, minimal site disruption and contrary Plan Winnipeg concerns, modification potential for the nursery is high.

Service Yard Analysis:

- Functions as the maintenance centre of the site, therefore its removal would reduce O & M quality for those parts of the site requiring it.
- High capital cost would restrict its removal.

- Plan Winnipeg concerns would modify the area to also function as an interpretive centre.
- The loss of service jobs would be seen as politically unacceptable.
- Site disruption would be high with the removal of the yard.
- No community use.

Modification Potential: The service yard maintains the playing fields, pathways, fields and lake. In an ecological park management would still be required hence modification potential would be low.

Riverbank Analysis:

- Little maintenance cost other than the control Dutch Elm disease.
- High capital cost to replace the riverbank zone with vegetation.
- The riverbank is a high priority protection zone of Plan Winnipeg.
- The public desire for wooded areas would make removal of the riverbank zone unacceptable.
- Site disruption would be great if the riverbank zone were highly modified.
- The proximity of the river makes the zone a moderate use area for fishing, canoeing or bird watching.

Modification Potential: Given the importance of the riverbank to Plan Winnipeg concerns and public desire for woodlands modification potential is low for the riverbank zone.