University of Rhode Island
DigitalCommons@URI

Open Access Master's Theses

1988

Open Space Evaluation and Preservation: A Case Study

Mary Ann L. Carpenter
University of Rhode Island

Follow this and additional works at: https://digitalcommons.uri.edu/theses

Terms of Use
All rights reserved under copyright.

Recommended Citation
Carpenter, Mary Ann L., "Open Space Evaluation and Preservation: A Case Study" (1988). *Open Access Master's Theses.* Paper 655.
https://digitalcommons.uri.edu/theses/655

This Thesis is brought to you by the University of Rhode Island. It has been accepted for inclusion in Open Access Master's Theses by an authorized administrator of DigitalCommons@URI. For more information, please contact digitalcommons-group@uri.edu. For permission to reuse copyrighted content, contact the author directly.

OPEN SPACE EVALUATION AND PRESERVATION

A CASE STUDY

BY

MARY ANN L. CARPENTER

A RESEARCH PROJECT SUBMITTED IN
PARTIAL FULFILLMENT OF THE REQUIREMENTS
FOR THE DEGREE OF MASTER OF
COMMUNITY PLANNING AND AREA DEVELOPMENT

UNIVERSITY OF RHODE ISLAND
1988

MASTER OF COMMUNITY PLANNING AND AREA DEVELOPMENT

RESEARCH PROJECT

OF

MARY ANN L. CARPENTER

Approved:

Major Professor _____
John J. Kupa

Acknowledged:

Director _____
Howard H. Foster, Jr.

ACKNOWLEDGEMENT

This project represents my greatest individual effort in graduate school and the most difficult work of my academic career. In completing it, I benefited from the help of many people. The East Providence Planning Department, particularly George Caldow, was very helpful in supplying suggestions and information. Mr. Stan Wescott, the leader of the Rumford Neighborhood Association, kept me informed of the progress of the negotiations with The Robbins Group and was never too busy to speak with me.

Dr. John J. Kupa and Dr. Howard H. Foster, Jr. of the Department of Community Planning and Area Development (CPAD) at the University of Rhode Island provided the necessary guidance on form and technical matters as well as inspiration and support. In addition, the entire faculty and staff at CPAD were always ready and willing to lend a hand.

Last, but certainly not least, the students of CPAD, particularly those with whom I began the program in September 1986, listened to my complaints and triumphs throughout the project and the two year curriculum. For them I will always have a special fondness.

M.A.C. May 11, 1988

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Introduction

It is a natural characteristic of human nature to take resources for granted. These items include people, employment, health, goods, products and both renewable and non-renewable natural resources. When they are taken for granted, it doesn't mean that they are valued less, but that it is assumed they will always be within reach in abundant supply without threat of depletion.

It was not so long ago that it was acceptable and even expected that one should have a rather cavalier attitude toward resources. In 1966 Kenneth Boulding described that type of economy as a "cowboy economy," saying that the cowboy is "symbolic of the illimitable plains" (Boulding 1966, p. 3). He described the situation then as an open economy of infinite reservoirs of resources. Indeed, to the homesteaders, the availability of land on the western plains must have seemed limitless. However, as populations grew along with technological innovation, the possibility that there could be limits to the resource reservoirs became a reality. Now the cowboy economy can be seen in contrast with the more modern closed economy called the "spaceman economy." As Boulding explained, "In the spaceman economy what we are primarily concerned with is stock maintenance..." Consumption is to be limited in some way.

R. Buckminster Fuller described the situation in another way in Operating Manual for Spaceship Earth. He spoke of the regenerative abilities of industrial society

which is able to produce more and better products with less resource investment. Mass production and its accompanying monetary benefits cannot be accomplished without mass consumption. He continued by saying that only humans have the ability to recognize the regenerative qualities of such resources as fossil fuels; and they must use that ability to

> "convert man's spin-dive toward oblivion into an intellectually mastered power pull-out into safe and level flight..."

Open space is not a regenerative resource, but one which can be preserved or destroyed by human intervention.

Nearly everyone has felt a twinge of sadness over the loss of some favorite open area. Willa Cather captured that feeling through the thoughts of Niel Herbert in her novel A Lost Lady.

> "The Old West had been settled by dreamers, great-hearted adventurers who were unpractical to the point of magnificence... Now all that vast territory they had won was to be at the mercy of men like Ivy Peters...The space, the colour, the princely carelessness of the pioneer they would destroy and cut up into profitable bits, as the match factory splinters the primeval forest. All the way from the Missouri to the mountains this generation of shrewd young men, trained to petty economies by hard times, would do exactly what Ivy Peters had done when he drained the Forrester marsh."

This research project examines one aspect of the open space issue. That is the existence of open space in the neighborhood. This category includes the vacant lot or remnant of woodland on which many youngsters have played. It is the loss of these localized scraps of land which can

have the most profound impact. The loss of open space in the context of this project is not necessarily negative. Rather it is a change from open space to another land use. The open space is lost in the sense that it will never be restored to its current condition.

The project presents two useful tools for the planner in dealing with open space. The first is the methodology of assigning a value to the space at the neighborhood level, and the second suggests ways in which open space can be preserved and included in development plans. In doing so it begins with an examination of the definition of open space in Chapter I, "Open Space Definitions and Evaluation Methodology." The term open space is a broad one which includes several varieties. These varieties are enumerated and their characteristics explained. Next, there is a consideration of the value of open space, those who consider it valuable and the methods of assigning a value.

Chapter II, "Old Bridgham Farm--Background and Evaluation" presents a case study which illustrates many of the previously developed points and issues. A development site in East Providence, Rhode Island is analyzed from three levels. The first is the impact the project will have on quality of life compared to the value of the site to the neighborhood in its current undeveloped condition. The second is an environmental analysis which quantifies the site's role in the control of urban runoff. The third level of analysis is the examination of the open space network and

the place which the site occupied or could have occupied in it.

Chapter III, "Planning for Open Space" addresses ways to allow for open space in development projects as well as ways to preserve open space in its entirety. Chapter III will be helpful to local planning departments in their efforts to preserve what was once considered abundant, but is fast becoming a scarce resource.

Planning is for the present and for the future. The availability of open space in the future can be ensured if the words of Will Rogers are remembered--"Land, they don't make it anymore."

Chapter I

Open Space Definitions and Evaluation Methodology

Rationale. Why should open space be evaluated, besides the fact that we can't be cowboys anymore and in many areas have to work in a spaceman economy? Following the pendulum swing of history, it can be seen that open space is now being recognized as an important factor in the health of human beings. This recognition has grown along with the nation.

Immigration and technological innovation in the early 1800's produced a concentration of population and increased sprawl in the cities. In the 1840's, the Parks Movement became popular, and greenspace was seen as a means of combatting the dirt and overcrowding of the cities. In 1856, land was purchased for Central Park in New York in recognition of the need to maintain some open space in the city.

Later, in 1893, the World's Columbian Exposition gave birth to the City Beautiful Movement, which encouraged the consideration of aesthetics and recognized the need for City Planning. Around the same time, Ebenezer Howard inspired New Town Planning through his book, Garden Cities of Tomorrow. The planning profession grew in the early 1900's, but was overshadowed in the 1930's and 1940's by the Great

Depression and World War II. Later the Baby Boom saw the growth of suburbia and the welcoming of development.

The 1960's produced a generation willing to fight for just causes. The 1970's brought a realization that causes won't be taken seriously unless they have teeth--a defensible rationale. The defense of open space is a "toothless" cause, if it is defended only for its beauty. The modern view of open space is a holistic one which includes ways in which humans can work to preserve open space ways in which open space can work for humans by protecting watersheds, providing recreation areas, making cities more attractive and adding positively to physical and mental well being.

Not surprisingly, sentiment and opinion regarding the open space issue run high. Those who seek to preserve the environment have data to support their cause, and the builders and developers have equally impressive data to support the continuing building boom.

The 1982 Census of Agriculture reported approximately 62,466 acres of land in farms in Rhode Island. Of that, approximately 20,000 were woodland and approximately 42,466 were non-wooded farmland. The 1987 United States Forest Service Timberland Survey listed 371,718 acres of timberland for Rhode Island in 1985. The total of farm and forest land comprises about 63 percent of the total land area of the state. However, it includes farm houses and low density development in and around forested areas. The

Office of Statewide Planning's 1987 inventory of state owned land shows approximately 33,000 acres devoted to open space uses. Total acreage in the State is approximately 700,000 acres.

This should be considered together with the fact that Rhode Island is the second most densely populated state in the United States (Lord, 1987). Its suburban populations have grown by large percentages between the 1970 and 1980 censuses. Glocester, for example experienced an increase in population of 46%, Smithfield 25%, Providence 12.5%, Narragansett 69%, West Greenwich 49% and East Providence 5.8%. Part of this trend is the "discovery" of Rhode Island by the Boston housing market. Builders estimate that in the next five years there will be demand for 30,000 new homes. Statewide Planning's Technical Paper No. 129 "Housing and Residential Land Demand: Rhode Island 2010," makes a conservative estimate of the need for 70,000 residential acres by the year 2010.

This situation does not appear alarming in light of the total open space acreage in the state. However, Robert C. Bendick, Jr., Director of the Rhode Island Department of Environmental Management points out that along with acres needed for residences, we must also consider acres for roadways and other services needed for the increasing population. His estimate is that Rhode Island has five years left to preserve what is left of its open space (Lord, 1987).

In a recent Boston Globe newspaper article dated April 10, 1988, statistics showed that new construction in neighboring Massachusetts is eliminating 600 acres of farmland, forests and open space per week. On Cape Cod the population has grown by 27 percent in the last ten years, and housing stock has grown by 43 percent. Water quality on Cape Cod had deteriorated causing the closing of 5,348 acres of shellfish beds, an increase of 650 percent from 1980. A recent estimate by the Federal Highway Administration said Boston drivers spend 45 million hours a year stuck in traffic on major highways (Tye 1988). A 1985 New York Times article revealed that the Federal Department of Agriculture, relying on current trends, calculated that by the year 2000 there would be no farms left in Rhode Island (Wald 1985).

Although the figures in connection with the open space issue are sometimes difficult to interpret, it is certain that controversy surrounds most decisions regarding it. What is important to the individual may not be so for the community. What one person considers essential another might consider expendable.

In the midst of such a fracas the planner could find him/herself in the position of defending open space or at least trying to decide on its importance or lack thereof. Importance becomes more apparent when a workable number can be used in impact analysis or in benefit/cost analysis.

Definitions. The investigation of any resource must begin with a basis of understanding of its multi-faceted

nature. Hard work can result in what is only perceived progress unless there is a beginning point of common understanding. This is the case with open space, a seemingly simple one dimensional resource. At first glance, open space presents little cause for differences of opinion. Yet in developing a workable definition of open space, it becomes apparent that there are many differing perceptions of the concept.

To ask ten people to define open space raises the possibility of eliciting ten or more different answers. These could include a backyard, a wooded acre, a schoolyard, a dead end street, a vacant lot, a neighbor's garden, a public park, a parking lot, a salt marsh, a fresh water wetland, an abandoned field. To consider the category of open space it is necessary to define it broadly enough to include all of these aspects.

Beginning with some degree of consensus, for the purposes of this report open space is defined as any parcel or area of land or water essentially unimproved and set aside, dedicated, designated or reserved for public or private use or enjoyment of owners and occupants of land adjoining or neighboring such open space; provided that such area may be improved with only those buildings, structures, streets and off street parking and other improvements that are designed to be incidental to the natural openness of the land.

Types. In expanding from the working definition, types of open space are easily recognized. These can be broken into four broad categories. The most familiar type is publicly owned open land. These public forms of open space can be ball fields, cultivated, landscaped gardens, wild wooded areas or some combination of all of them. Of particular appeal is the "vest pocket park," which is a small open area usually set off slightly so as to offer an inviting restful place (Faraci, 1967).

The second category is citizen regulated open space. This includes parcels which are in private ownership by an individual or a group of individuals. Private golf courses, community gardens, common areas in condominium developments and backyards fall into this "pedigreed" open space, which has some of its naturalness remaining but is clipped and cultivated (Cashan et al, 1984 p. 9).

The third category to consider is that which is labelled vacant. It includes two sub-categories to which the term "vernacular" open space applies (Cashan et al, 1984 p. 9). First, there is vacant land. This is the more preferable subcategory. Obviously, it is a parcel upon which there are no buildings. It is preferable because nearly all of its potential has yet to be realized. Vacant property applies to the building which is not in use. Vacant property has potential but that potential cannot be reached without first solving such problems as delinquent taxes, clouded ownership and hazardous site conditions.

The fourth category should be called unintended uses or special uses, and it contains some overlapping with the previous three categories. Waterbodies, for example, rivers and lakes are a special type of open space. Their ownership is public or private and they can be used for their passive recreational vistas or more active sports such as fishing and watersports. Rooftops can provide the some kinds of open space ranging from areas for sunning to jogging paths atop downtown office buildings.

Unintended uses, of course, are those spillover effects which reach beyond the original purpose of a particular land use (Clawson, 1969 p. 143). Highway and utility rights of way, for example, have shown importance as habitats for certain birds and other wildlife. Private owners can unwittingly provide an open space amenity to others. For example, a beautifully landscaped backyard is available only to its owner, but the neighbors may enjoy a pleasant view from a distance. A private walkway over which other are not prevented from passing provides a type of open space whose legalities are discussed in the next section.

Finally, farmland is a unique type of open space. First of all, it does not fit the definition which was developed in the beginning of this chapter. Farmland is used as a source of income and it normally contains an operating place of business and a residence. However, because of the amenity farmland provides in its vistas,

views and activities, it is included as a type of open space.

Forms of Ownership. Owners of open or uncovered space at the national level include the Bureau of Land Management and the National Parks Service, both of which are branches of the Department of the Interior. State ownership can cover parks and public water supplies, for example. At the local level, ownership can vest in the municipality, a group of individuals such as the neighborhood association or the private citizen.

No matter what the entity is, public or private, knowledge of the various forms of ownership is worthwhile (Lynch, 1986, p. 255). Fee simple ownership means the entity named in the deed of conveyance owns the property outright, free of claims of others except those specifically delineated in agreements between the two parties. Such an owner may grant someone an easement over the property, and in so doing, s/he grants a right to use the property for some purpose such as access by vehicle or on foot, access for drainage or for maintenance of utility lines. The person who is granted the easement has an appurtenant right over the grantor's property.

Ownership can become splintered as in the case of a deceased owner who left no will. Here the property will be splintered among his/her heirs. If there were six heirs, for example, each will receive a one-sixth undivided

interest, meaning that fractional interest belongs to that heir alone and to no one else.

The world being what it is, land ownership often becomes clouded or confused. Then the courts must sometimes make a decision. In the case of open space, someone who thinks s/he has rights over a piece of property could try to prove implied dedication or adverse possession. Implied dedication pertains to the owner who has not prevented the public from crossing a portion of land. In other words, his/her actions imply that s/he has no objection to such use of the property. From another perspective, adverse possession of property describes the situation in which someone claims ownership of property by virtue of uninterrupted use over a long period of time (usually at least 20 years).

These are the basics of real estate ownership. One additional form is a leasehold arrangement which, of course, occurs when an owner rents some or all of his/her property to someone else.

Functions. The most easily recognized function of open space is for use in recreation. Large open areas serve as places for ball games, skating, bicycling or practicing a golf shot. These are all forms of active recreation. There are more passive forms as well, such as bird watching, meeting a co-worker for lunch in an urban park or walking on a bike path. These two forms can exist side by side in the same space. Urban gardeners can find great sources of

relaxation in the small garden plot. Utilitarian functions include future school sites, protection of watersheds and protection of water supplies.

Stepping away from the individual's perception, it is important to see a broader view. City officials often see the function of open space as a system or network throughout a city or a region (Bair, 1968). It is often difficult to fix a number to future needs for open space, but the existence of a system of public or quasi-public land can be adapted to the multiple purposes described above.

Taking one more step back reveals the role open space plays in meeting broad social goals and addressing basic human needs. Human existence is a continuum often studied by the physical sciences (Primack 1987). Physical health and economic well being are the factors most often named in discussions of quality of life. Sometimes the fact that a person's surroundings affect physical health is overlooked. In discussing problems, the physical environment is sometimes included in the background of problems such as homelessness, poverty, crime and racial problems. However, the physical environment should be looked at as an issue in and of itself. Such an examination would reveal its usefulness as an intervention point in what can be a defeating continuum, particularly in the city. The presence of some amount of open space on the way home from work or school for example can change a person's attitude, provide a respite or a bit of shade on a hot summer evening. The long

term values of such things to the human psyche and overall health have been recognized and can be addressed as individual issues. The chance to ride a bike in a safe park or to grow radishes in a community garden plot can mean a major difference in the way children grow and in the way adults look at the world. At the same time, the lack of pleasant or even decent surroundings silently labels people as inferior (Jones, 1987).

From an economic viewpoint, the presence of a well maintained park can boost a city's property values and have a snowballing effect by attracting tourists and business developers. Green areas have impact on individual well being and therefore, they have an effect on major aspects of a city, including its housing, economic climate and tensions (Primack ed. 1987). Therefore, they should be included as primary components of planning. A recent description of the role of green spaces is as follows,

> "the ideal city is a web of hard public spaces and another of soft landscaping that are interwoven to create a rich choice of routes and mix of different sorts of space for many kinds of activities." (Buchanan 1984).

Values, Economic. In working to maintain or establish such a web of spaces, planners will need to defend open space by showing reasons why its complete or partial preservation should be considered as an alternative. To do so with a level of conviction, it is necessary to know the value of the open space in specific, meaningful terms (Opaluch, 1984).

As mentioned above, open space serves many functions. However, preserving open space because of its panoramic vistas is not a defensible rationale. It is important to develop means of assigning a value. The planner should try to see the value as it applies to different levels, that is the broad value to the city's open space network, the more narrow individual or neighbor and the value to the developer. Economic evaluation techniques are one of many ways of measuring benefits. The following two apply well in determining preferences associated with open space.

The first evaluation method is the contingent valuation approach and it focuses on deriving a value based on consumers willingness to pay. Their willingness can be determined by surveys or interviews. The resulting figures can be used to derive a demand curve, which gives an actual dollar value to an amenity such as open space. More specifically, in the case of open space, this approach can be applied by asking consumers how much they would be willing to pay to use a park, or a beach, for example. The question could be based on payment per visit or payment per year. The goal is to obtain a range of willingness to pay from small amounts to higher amounts, resulting in a profile of consumer preferences or a demand curve for the particular amenity being studied. An example of the dollar figures in the form of an aggregate bid schedule is shown in Figure 1.1.

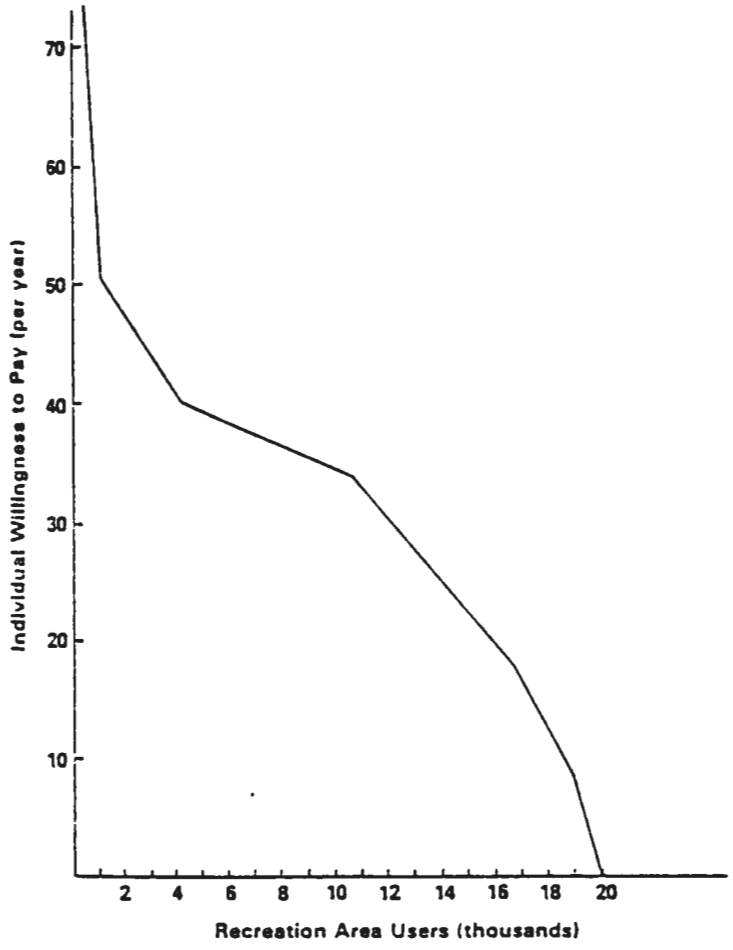


Figure 1.1 Aggregate bid schedule for access to recreation area based on survey data on willingness to pay. Source: Hufschmidt et al 1983

Economists call the entire area under the demand curve the consumer surplus and use it to give the value to society of the amenity being studied. (See Table 1.1)

Through a questionnaire, the interviewer can ask the user directly what amount s/he would be willing to pay for something like a trip to the beach. However, this approach is not always effective in eliciting a response because it can leave the interviewee somewhat at a loss (Hufschmidt et al 1983, p. 235). The converging bid approach can be more effective because it begins by asking an amount, then increasing the amount until the user's willingness to pay is

exceeded (until the respondent says "I won't pay any more than that.") Since most planners are not economists, many of the more precise details of this method would not necessarily be part of a planning study. Nevertheless, this method is important to the planner because it provides a means of assigning a dollar amount to an amenity which is not usually measured by a monetary value. It gives an estimate of the order of magnitude of benefits derived by users from an existing system (Hufschmidt et al 1983 p. 237).

Table 1.1 Willingness to Pay for Access to Recreation Area (Hypothetical Example)

Willingness to pay	Number of individuals: Sample of 5%	Number of individuals: Total population	Total willingness to pay[a]
0 to $10	50	1,000	$5,000[b]
10.01 to 20	100	2,000	30,000
20.01 to 30	200	4,000	100,000
30.01 to 40	450	9,000	315,000
40.01 to 50	150	3,000	135,000
more than 50	50	1,000	100,000
Total	1,000	20,000	685,000

[a]Total population × midpoint of willingness-to-pay range. For over $50 range, midpoint is taken at $100.

[b]$1{,}000 \times \frac{0 + \$10}{2} = \$5{,}000.$

Source: Hufschmidt et al 1983

A variation on the contingent valuation method is asking users about the amount of compensation they would be willing to accept in connection with the loss of some amenity (Hufschmidt et al 1983 p. 237). Information revealed through this approach is likely to show a higher dollar amount than that given for willingness to pay. Most people are more willing to accept higher amounts in compensation than they are willing to pay. This being the

case, one possibility would be to use this approach together with the willingness to pay approach so as to arrive at high and low limits.

Another variation is to have the interviewer present the consumer with a group of choices of possible development scenarios ranging from no change to higher levels of development along with the associated environmental degradation (Hufschmidt et al 1983, p. 242). In this case the interviewer asks the consumer how much s/he is willing to pay to prevent development from taking place. The amount that is given is a reflection of the value of the amenity as it currently exists. If the consumer is willing to pay a high price to prevent development, the existing amenity has a value in an undisturbed state.

These evaluation techniques based on surveys are useful in arriving at a value for intangible items such as natural vistas or clean air. Through them, implied values can be given to preservation efforts. However, the use of these techniques alone does not provide a definitive decision on the advisability of proceeding with a certain project (Hufschmidt et al 1983 p. 253). It does give a more specific meaningful dollar value to amenities which are not usually considered in monetary terms.

To use them effectively, the interviewer must be aware that there are certain biases which apply to the approach. The first is strategic bias. This refers to the situation in which respondents answer in ways which are not completely

truthful, because they believe their answers will affect their own costs. If they feel that they will receive a tax based on their response amount, they will be likely to lower the amount (Hufschmidt et al 1983 p. 253). If they feel certain that costs will be borne by others, their responses could be in higher dollar amounts. In other words, this bias depends on how much respondents feel their answers will affect the outcome.

Another bias results from supplying the respondent with poor or incomplete information. Since the answers are based on somewhat hypothetical questions, detailed information on choices must be given to assure reliable responses. The use of hypothetical means introduces the possibility of hypothetical bias or inherent error in the very fact of relying on less than actual situations.

As with all surveys, the survey instrument itself can introduce a bias by steering respondents. In the "willingness to pay" format, this is particularly true when a dollar amount is introduced (willingness to pay $10.00 for example). This can immediately give a starting point bias to the survey. The best way may be to ask the respondent for a dollar amount and prompt him or her only if it is necessary. The existence of these biases together with the time commitment and cost associated with conducting surveys are drawbacks to the approach. However, they should not rule out its use by planners who need tangible measures of values with which to work.

The travel cost approach to evaluating the benefits of an amenity was developed to measure the values of recreational sites such as parks and lakes (Hufschmidt et al, 1983, p. 216). It can, however, apply to other situations. It operates on the premise that the real value of a site is not reflected in the nominal entrance fees which are charged. Rather, a more accurate measure is the amount visitors are willing to pay to get to and from the site. By looking at these amounts, the demand for the site can be determined. This method is not hypothetical, but site specific, and it applies to actual users. The rationale involved is that users who are close to a site will have lower costs involved in getting there and, therefore, they will have higher demand for the amenity. They will be willing to visit it more often. Those from further away will have higher costs associated with getting to the site and accordingly will have a lower demand.

Specific details of implementing this approach are found in Chapter 6 of Environment, Natural Systems and Development (Maynard M. Hufschmidt et al, 1983). Basically, the area surrounding a site is divided into concentric zones representing increasing levels of travel costs. An interviewer conducts a survey of users at the site to determine the zone of origin, travel costs, visitation rates and socioeconomic characteristics such as education and income. Regression analysis is then performed to test travel costs as an independent variable producing change in

visitation rates, the dependent variable. This base information results in a point on the demand curve for the site where it is assumed that the entrance fee is zero. This is Point A in Figure 1.2.

From this, change in demand can be plotted in response to increases in the entrance fee. For example, a one dollar increase in admission charge could lead to Point B in Figure 1.2. A hypothetical example (Knetsch & Davis 1966) began by showing average travel cost per visit. Using a linear relationship between travel cost and visits per one thousand population, the results of increasing travel cost by one dollar per zone were shown. See Table 1.2. The changes in total numbers of visits brought about by each one dollar increase were calculated and plotted in Figure 1.3. The area under the demand curve is called consumer surplus in economic terms, and it is a reflection of the total value of the site which was examined.

In sum, what this approach does is make it possible to calculate the demand for an unpriced good (Hufschmidt et al, 1983, p. 231). However, the approach operates under several assumptions. The first is that all users obtain the same benefit from the site. Second is that the benefit derived by the user from the most distant zone is zero. Third is that travel cost is a reliable proxy for price. Fourth is that people in all zones derive the same benefit from the activity on site.

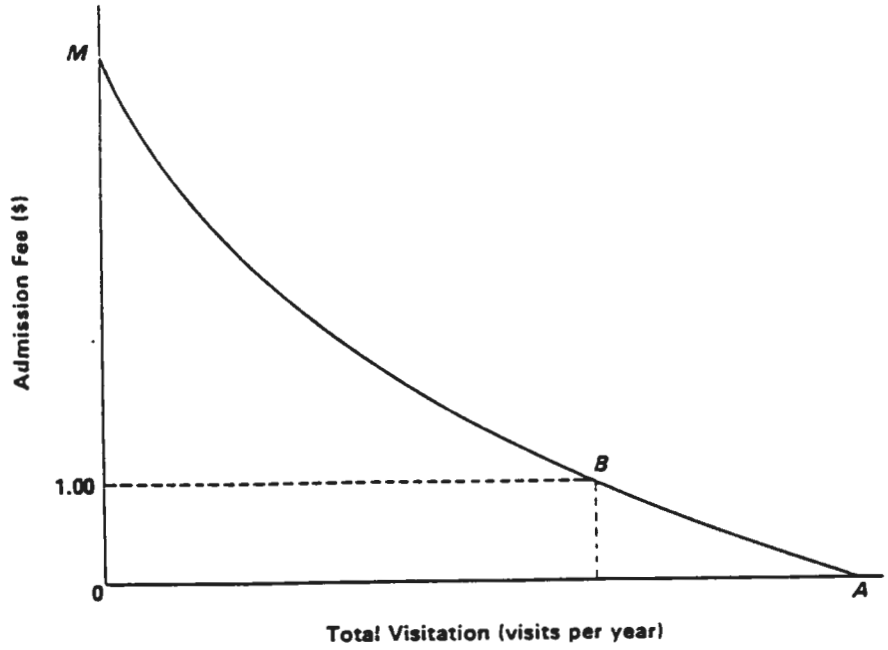


Figure 1.2 **Demand curve for outdoor recreation at a specific site.**

Source: Hufschmidt et al 1983

Table 1.2 **Visits to a Recreation Area, Assuming $1 Entrance Fee**

Zone	New cost ($) (*C*)	Visits/1,000[a] population	Population (thousands)	Visits
I	2	300	1	300
II	4	100	2	200
III	5	0	4	0
				500

[a]Visits/1,000 population calculated from equation 6–22: $V/1{,}000 = 500 - 100C$.

Source: Hufschmidt et al 1983

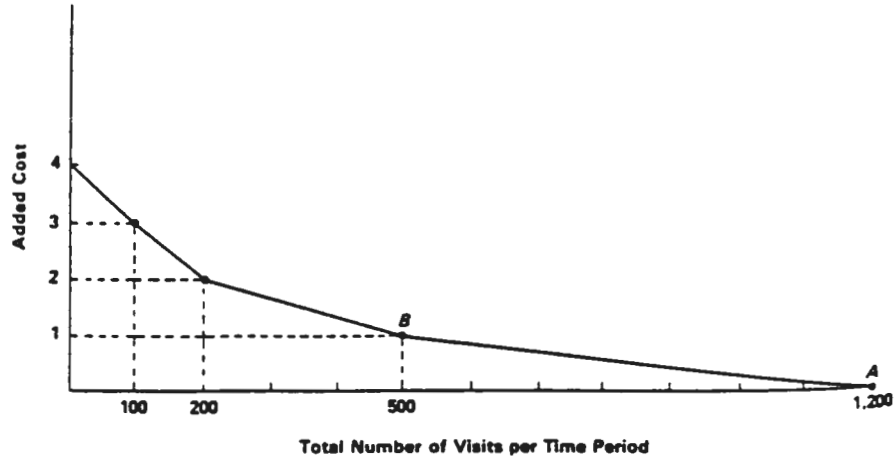


Figure 1.3 **On-site experience demand curve for recreation area.**

Source: Hufschmidt et al 1983

Because of these assumptions and the site specific nature of the travel cost approach, it should be used carefully, with a recognition of other values that it doesn't measure. For example, it doesn't measure the option value of an amenity, which is the willingness to pay to keep it available or to keep the option of using it open. Another is the preservation value of an amenity, or the desire to keep an amenity even if it is unlikely that one will ever use it. Proceeding with these shortcomings in mind, a planner can use the travel cost approach particularly effectively in evaluating recreational open spaces.

Values, Environmental. A practical, utilitarian value of open space is its effect on controlling storm water runoff. It would probably never be discussed in the survey based approaches, because it is a value of which many are unaware. Filtration of water through grassy areas and then into the soil provides a natural cleansing and removal of many pollutants such as phosphates, grease, nitrates and heavy metals. Surfaces which allow this filtration are known as pervious surfaces and they include grassy areas and gravelly drives which allow water to pass through into the ground.

As areas become more developed, there is more impervious material including roads, structures, rooftops and driveways. The result is that natural infiltration of rainfall into the ground with the resultant cleansing does

not occur as readily. Rainfall runs off paved surfaces quickly and reaches rivers, streams, ponds and ground water aquifers in an unfiltrated state. Runoff is a non-point source of water pollution, since the exact location is not easily identifiable. Point source pollution can be traced to a specific location such as a pipe. In an Environmental Comment article written in December 1978, Connie Weiss O'Mara quotes William K. Reilly, President of the Conservation Foundation as saying that runoff contributes fifty percent or more of the pollution in some areas.

Runoff can be measured through the use of the 208 Federal Water Quality Planning Program Model authorized by the Federal Water Pollution Control Act of 1972 (later known as the Clean Water Act.) The Model can be used for small watersheds and begins by dividing the area according to hydrologic soil group, amount and type of urbanization (such as residential, 30% impervious) and the type of vegetation (good grass cover). From this a curve number is calculated which can then be used to determine runoff in inches from the site.

Peak discharge can also be calculated through the 208 Model. This is the highest amount of runoff coming off the site during a storm event. It is measured in cubic feet per second. As the amount of impervious surface increases, the time needed to reach peak discharge decreases, resulting in much more damaging and extreme effects than those seen in areas left in natural vegetative pervious cover. This

information is extremely important for impact studies comparing present and future condition scenarios. The 208 Model also gives adjustment factors for slope, ponds and wetlands found within the watershed and adjustments for changes in hydraulic length. These factors have an impact on runoff coming off the site. More details are available from local Soil Conservation Services.

In addition to filtration of pollutants, flood control is another major environmental value of open space. As mentioned in the peak discharge discussion, planning which does not consider runoff can result in flood damage. Costs are high for both treatment of polluted waters and for flood damage. These costs can range from a re-design of water treatment systems to the worst case scenario of a federal buy-out of damaged homes. Thus, the runoff consideration is a two sided situation covering human health, safety and welfare as well as the fiscal well being of a city or town.

Existing natural filtration systems should be recognized for their value, and development which occurs on them must proceed in harmony with the existing system. Developers can use the existing topography to control runoff. Grassed swales can direct runoff to collection points, such as detention and retention basins. These vegetated basins can then be used to hold runoff waters or gradually to release filtered runoff.

The value of open space in controlling runoff is its most utilitarian, practical value. The planner can easily

be informed of the extent of this value and arrange for limited upheaval to the balanced ecological system.

Values, The Network. Although the focus of this project is on open space at the neighborhood level, it is essential not to lose sight of the importance of the open space network or system. In the wild, or in less developed areas, a major concern is the provision of corridors for wildlife. Birds, deer, and even mice do quite a lot of travelling in their day to day existences. In light of this, any development which causes isolation or fragmentation of open space will have a detrimental effect on wildlife. Therefore, on an ecological basis, it is important to link open space in a system.

Humans, too, derive more value from efforts which provide some type of a network of greenery. Therefore, another consideration of the value to give a parcel of open space is the role it plays in a city's or a region's system of parks and green spaces. Even a small parcel could be a link between neighborhoods or a valuable addition to a park system. On the other hand, when put into this perspective, a parcel could be seen as expendable, or one which has no value in a network. Consulting a land use map, going for a helicopter ride or conducting a windshield survey are all simple ways of determining a parcel's value in an overall system. Considering this value gives an important perspective when considering future land uses.

Values, Aesthetic. While economic and environmental evaluation techniques are useful in developing dollar measurements, they can be time consuming and costly. Another method of assigning a value which takes less time is using a point system. This system can be developed by the planner and applied to evaluate a site in terms of such things as its use a recreation site, residential site or for its aesthetic value as an open area.

To be more specific, the site can be broken into several component parts, each of which contributes to the overall value. Points will be assigned to each of the components in light of specific criteria. The points for the components will then be summed to obtain a figure which represents the total value of the site. Of course, the point total will have no meaning to someone who is unfamiliar with the criteria used in the evaluation. However, the planner is doing the evaluating, and s/he can easily relate the criteria in a presentation.

As an example, Figure 1.4 shows a point system for measuring visual quality. Shown horizontally, the six elements to be measured are water features, topographic features, geologic features, vegetation, man made features and vistas or views. Shown vertically in the left column are the criteria to be applied to each feature as appropriate. These include the feature's prominence, its contrast quality, its quality in terms of diversity, its

FIGURE 1.4 AESTHETIC VALUES	WATER	TOPOGRAPHY	GEOLOGY	VEGETATION	MAN MADE	VISTAS/VIEWS
FEATURE PROMINENCE size in acres 0 to 5 points						
CONTRAST QUALITY 0 to 5 points						
DIVERSITY 0 to 5 points						
EDGE QUALITY 0 to 5 points						
VIEWABILITY 0 to 5 points						

edge quality (ability to provide contrast) and its viewability.

In the case of water features (lakes, ponds) they are first given a value in terms of their size in acres, ranging from one to five points. Since landform quality does not apply to water features, those two criteria are omitted. The next criteria is edge complexity. This refers to the level of change at the break between one feature and another. For example, a forested area which runs right up to the edge of a lake provides a sharp visual contrast and a place where a high diversity of wildlife and plant life come together. As such it would be given a high value.

The principal advantage to the point system is that it can be used by the individual planner quickly and efficiently. Acreage can be determined readily from maps such as U.S.G.S. quadrangles and dot grids or planimeters, and values can be assigned at a site visit. Although the point total will mean little to those unfamiliar with the system, the chief benefit will be that the planner will make him/herself aware of the strengths of a particular site. It also allows the comparison of two or more sites for their values as developable sites or sites which would be better left in their natural states.

If the planner decides that a parcel is valuable through the use of one of the techniques explained above, or through other means, s/he will then have to know the ways in which open space can be accommodated in development plans

and the ways of preserving open space outright. Clustering units in subdivisions, requiring performance standards in zoning ordinances and purchasing tracts outright are all effective measures which are discussed in detail in Chapter III. Before considering that aspect, however, Chapter II examines a specific development site in East Providence, Rhode Island. The site is introduced and described, then evaluated through the use of three techniques already described.

The planner is only as effective as planning tools allow him or her to be. Therefore, tests of those tools and techniques are essential. The remaining chapters are a continuation of this project and the application of techniques to a real parcel of land. They focus on a case study of Old Bridgham Farm, a parcel of land located in the Rumford Neighborhood of East Providence, Rhode Island. It is a parcel which was used as a working farm up to the 1960s, then was allowed to go wild for a period of about twenty years. After such a long period of time it has taken on the characteristics of an abandoned field and has been enjoyed by neighbors and abuttors. It was purchased in 1986 and is slated for development, which is viewed by many individuals in the neighborhood as a tragedy. Such a scenario presents an excellent opportunity for application of evaluation techniques for open space in order to derive values at both the individual level and the municipal level.

Chapter II

Old Bridgham Farm--Background and Evaluation

Background. The City. Founded in 1636 by Roger Williams, the City of East Providence is located at the head of Narragansett Bay on the east bank of the Providence River. It is bordered on the north by the City of Pawtucket, Rhode Island on the south by Barrington, Rhode Island, on the east by Seekonk, Massachusetts and on the west by Providence, Rhode Island. East Providence covers an area of 16.5 square miles, of which 13.3 are in land area and 3.2 are inland water area.

Served by several major transportation routes, it occupies a prime location in southern New England's urban network. Interstate Route 195 provides access to New Haven, Hartford, Boston and New York City by virtue of connections with Interstate 95. Cape Cod in Massachusetts is easily accessible by Interstate 195 to Route 6, and the City of Providence is 1.5 miles to the west. T.F. Green State Airport is 15 minutes away by automobile, and Amtrak passenger trains are accessible in Providence. For the purpose of familiarity, this section will briefly examine the City's Demographic, Housing, Economic and Recreation characteristics.

Demographics. According to the 1980 U.S. census, East Providence's total population was 50,980. Using the total land area amount, 13.3 square miles yields a density of 3,833 persons per square mile. For comparison, this puts

East Providence in 1980 at the fifth largest municipality in Rhode Island and the sixth densest. The change in population from 1970 to 1980 was 5.8%, which is a small increase when compared to such places as Narragansett which showed a 69% increase from 1970 to 1980. However, when East Providence is considered within the context of the five largest cities in Rhode Island, the 5.8% increase is the largest of the five. (See Table 2.1)

Table 2.1 Population Change in Rhode Island's Five Largest Cities

City	1970	1980	Percent Change
Providence	179116	156804	-12.5
Warwick	83694	87123	4.1
Cranston	74287	71942	-3.1
Pawtucket	76984	71209	-7.5
E.PROVIDENCE	48207	50980	5.8

Source: 1970, 1980 U.S. Census

Density also increased from 1970 to 1980 by 5.7%. Population projection estimates by the Rhode Island Division of Statewide Planning for the year 1985 show East Providence's population at 51,800 or an increase of 1.6%. This is slightly higher than the estimated change for Providence County (1.2%) and lower than the State figure of 2.2%.

The median age of the population in 1980 was 34 years. Changes in population from 1970 to 1980 show a decrease in those under 15 years of 8% and an increase in those over 65 of 4.7%. The age group of 15 to 64 comprised 61% of the

total 1970 population and 65% of the total 1980 population. The number of families in 1980 was 13,598. The number of households in 1980 was 18,605 which, when calculated with the population of 50,980, yields 2.7 persons per household, down from 3.1 in 1970.

Housing. Households are not the same as housing units. A household is a place in which one or more persons live as a single entity. A housing unit is a structure which contains a household. According to the 1980 census, East Providence had a total of 19,402 housing units. Of those, 9 were seasonal and 19,393 were year round homes. Of the year round homes, 758 were vacant and 18,605 were occupied. The total number of housing units for 1980 (19,402) shows an increase of 25.2% over the 1970 figure (15,494). Of the year round units, 62.5% (11,630) were owner occupied, and the remaining 37.5% (6,975) were occupied by renters. The average value of a home in 1980 was $43,800, in striking contrast to $116,000 in 1988.

Economics. East Providence appears to be taking its place in the economic boom which has been seen in New England. The 1980 census showed a total resident civilian labor force of 24,319, which represents an increase of 15.2% since 1970. The 1985 unemployment rate for the City was 5.4%, slightly larger than the State's rate of 5% and below the U.S. rate of 7.2%. The City's location made it attractive to industry in the past, and that situation continues with manufacturing (including jewelry) employing

the largest percentage, followed by services and retail trade (Division of Employment Security 1984). This breakdown is a reflection of the State employment situation (R.I. Department of Economic Development 1987.)

Preliminary figures for 1986 prepared by the U.S. Department of Commerce, Bureau of Economic Analysis shows Rhode Island's per capita income at $14,670, which is sixteenth out of the fifty states. 1980 census information showed that East Providence had 13,635 families. The median family income was $19,926, slightly higher than the state figure of $19,448 and higher than the Providence County total of $18,523. Broken down by percentages, the highest percentage of families (27.2%) falls in the income range of $17,500 to $24,999. When compared to the five major cities in Rhode Island, East Providence occupies third place in terms of median family income. (See Table 2.2)

Table 2.2 Median Family Income in Rhode Island's Five Largest Cities

City	1969	1979	Percent Change
Providence	8430	14948	77.3
Warwick	11006	21295	93.5
Cranston	10778	20651	91.6
Pawtucket	9265	17407	87.9
E.PROVIDENCE	10179	19926	95.8

Source: R.I. Dept. of Economic Development

Recreation. In October 1962 the Master Plan for Parks, Recreation and Open Space was adopted as part of the City's overall Master Plan. The plan established standards for the

location of recreational areas at distances close to residential neighborhoods and in sufficient amounts to supply the population. It also divided the City into four planning districts for greater ease of analysis and implementation of proposals.

The City is currently able to offer diverse recreational facilities and programs. There are three state owned parks, Veterans Memorial Parkway, Squantum Woods Memorial Park and Haines Memorial State Park. Beyond that there are forty-four city owned and privately owned recreational areas open to the public. In addition, there are twenty-five private facilities requiring user fees or membership fees, and six church affiliated facilities.

According to the established standards, the need for new facilities is very low, but there is a need for upgrading and renewal. The City has recently reviewed the Master Plan for Recreation, amended it and made recommendations for future improvements. This aspect will be explored further in the final section of this chapter.

Background. The Neighborhood--Rumford. Old Bridgham Farm is located in a neighborhood which has many unique characteristics. First, it is part of a historic district, included in the National Register of Historic Places. (See Figure 2.3) The Register is a record of structures, sites, areas and objects significant in American history and culture (Rhode Island Historic Preservation Commission, 1976. p. 59). The Farm itself was listed on November 28,

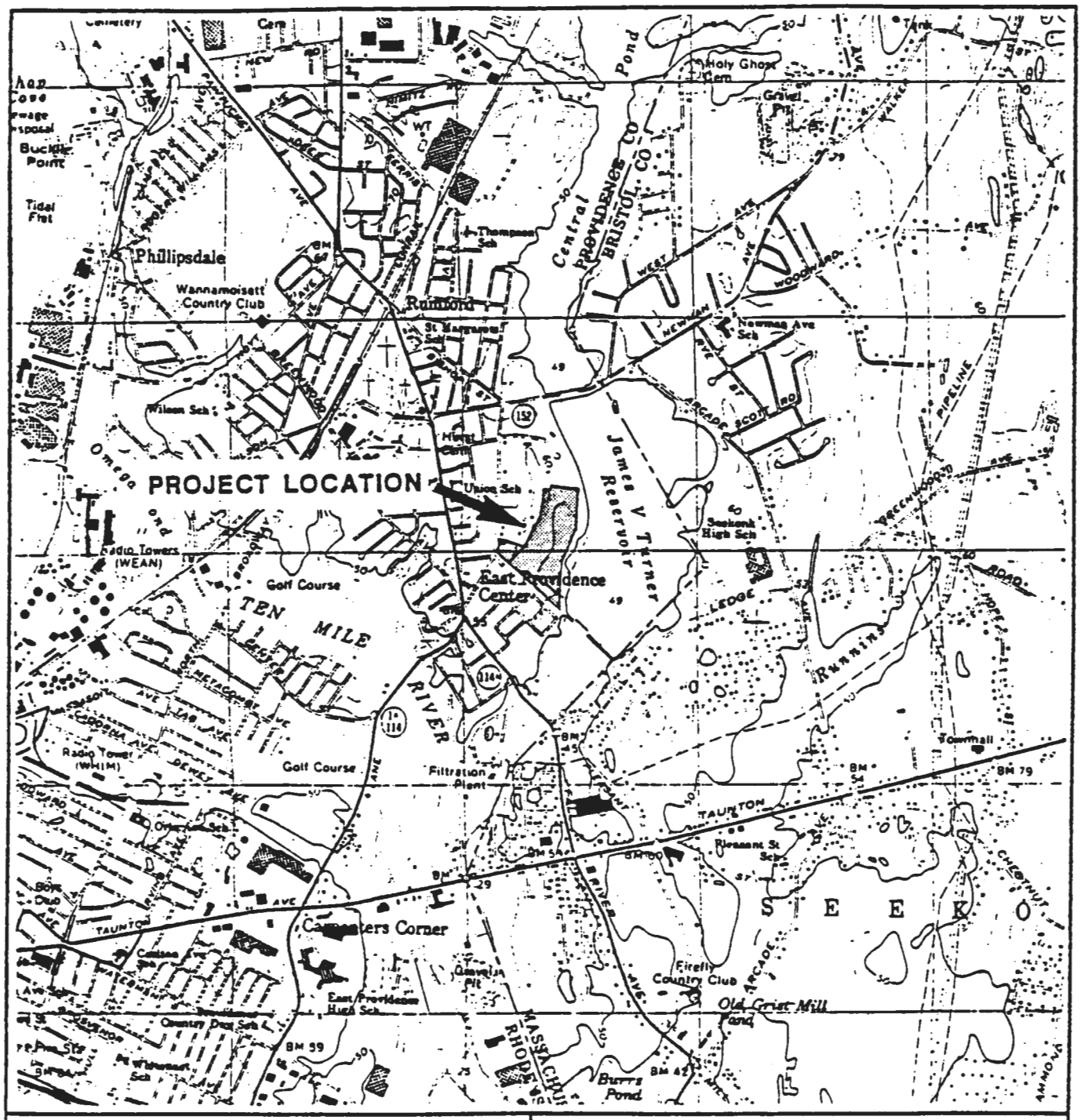


Figure 2.1

Project Location

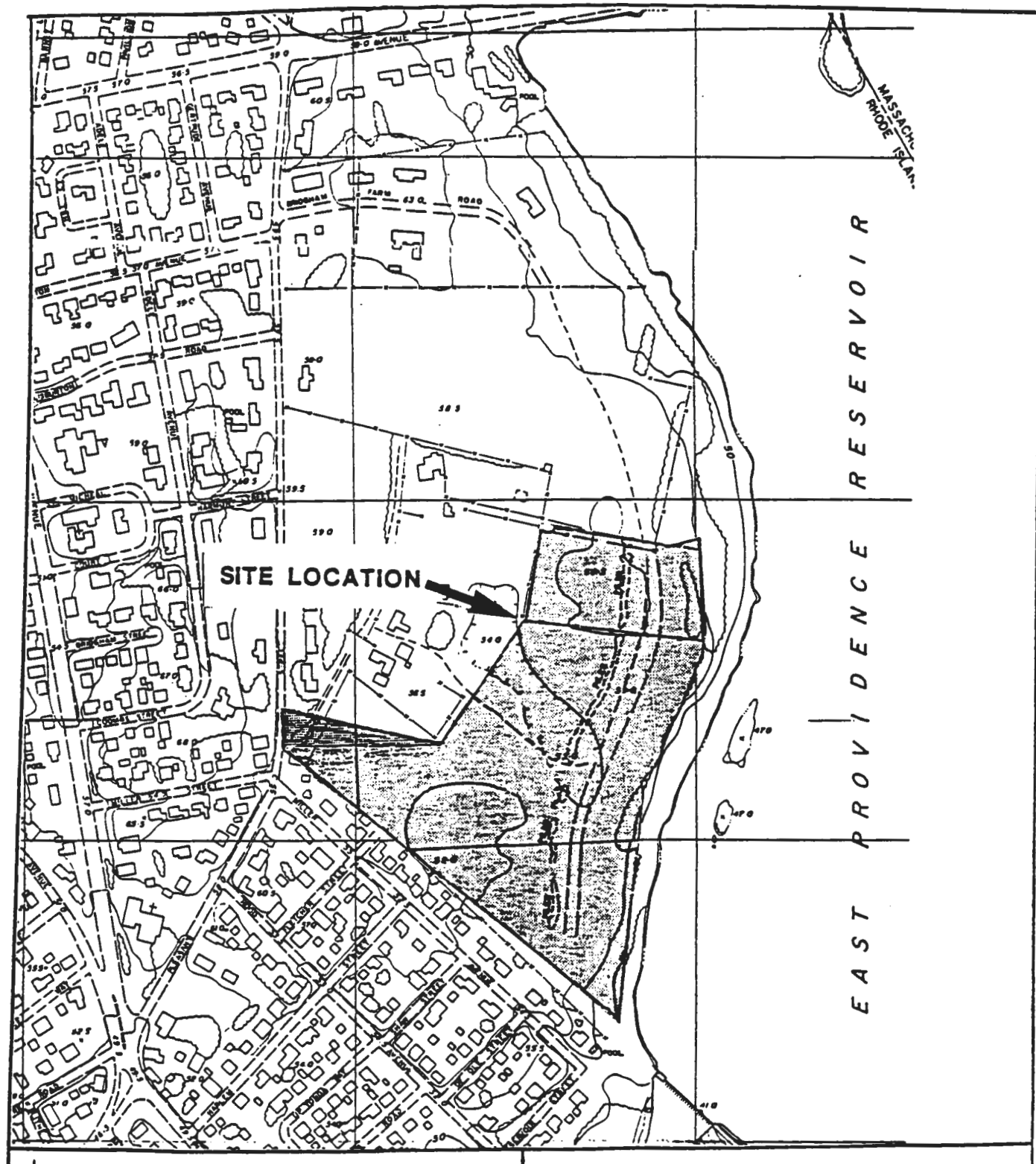


Figure 2.2

Study Area

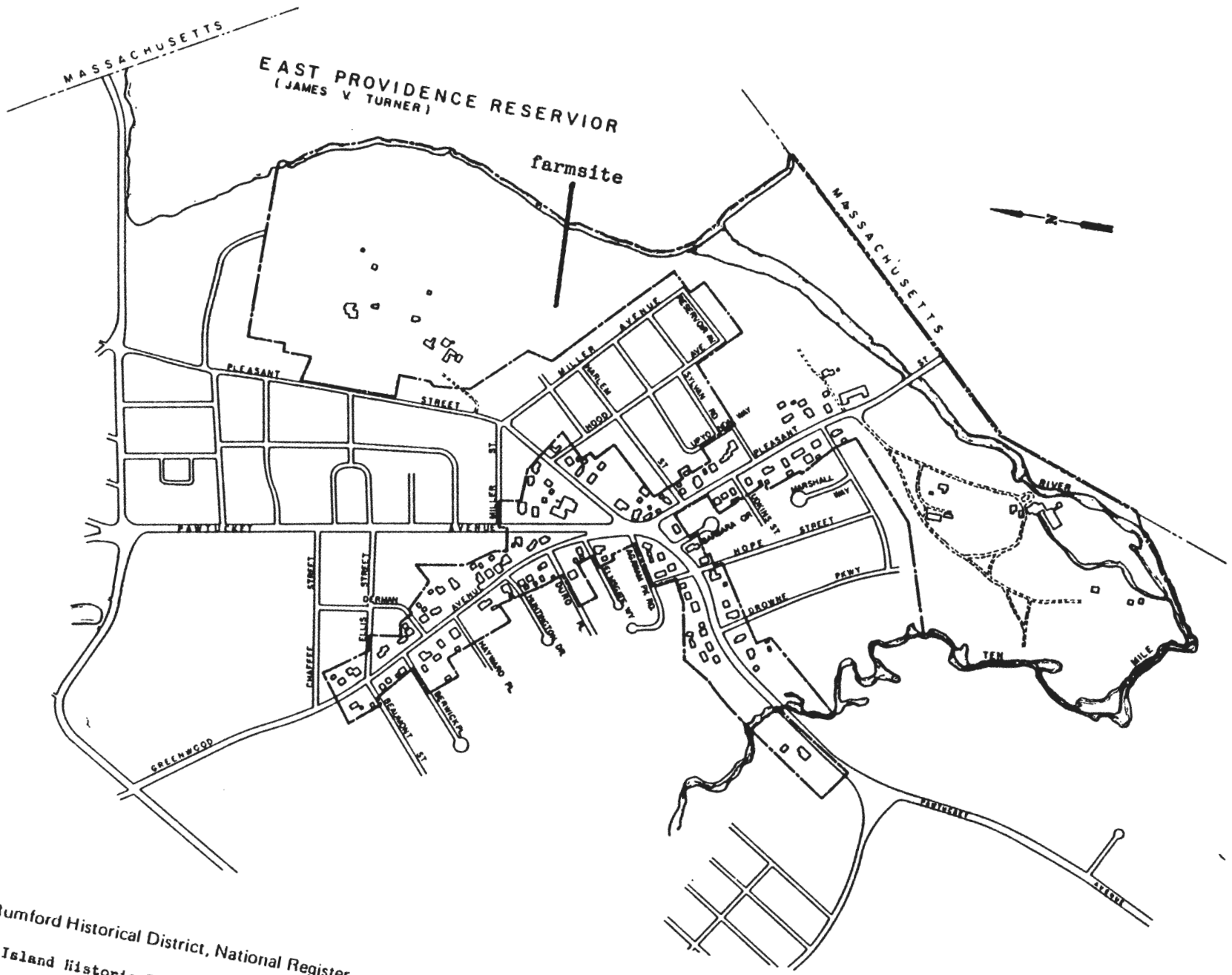


Figure 2.3 Rumford Historical District, National Register.

Source: Rhode Island Historic Preservation Commission

1980, and that listing includes the houses at 120, 148, 150 and 160 Pleasant Street. The structures and the land on which they are situated comprised the East Providence Multiple Resource Nomination, which was submitted to the National Park Service. Nominations must be made by states, and they are then reviewed by the National Park Service for approval, as authorized by the National Historic Preservation Act of 1966. Listing on the National Register is a prerequisite for eligibility for federal matching grant in aid funds.

The Hyde Bridgham House at 120 Pleasant Street was built in 1767. It is a two story Georgian dwelling with a gable roof and center chimney. It is a good example of a mid eighteenth century farmhouse and its grounds afford an idea of eighteenth century landscape (Rhode Island Historical Commission 1976, p. 71). Also on Pleasant Street is the Thomas Aspinwall House, which was built in the 1860's. It is a two story Victorian dwelling with Italianate details.

The Rumford Chemical Works on Greenwood and Newman Avenues was named in the same nomination to the National Register as the Bridgham Farm buildings. Its complex manufactured Rumford Baking Powder and Horsford's Bread Preparation and was built in the late 1800's. The company continued in operation until 1966 and was probably the largest land holder in East Providence in the late nineteenth century. Its holdings included most of the

property fronting on Ten Mile River and Seekonk River north of Omega Pond and eight hundred acres of farmland (R.I. Historical Commission 1976, p. 3). After the Depression, the existence of open, available land in the area near the plant attracted home builders and buyers. This area in the northern part of the City began to be called Rumford and it retains the name today.

To further distinguish the area, Rumford is the site of the first major settlement in East Providence. It was established in 1643, after Roger Williams and his followers were forced by the governor of Plymouth Colony to leave their settlement of 1636. It was first known as Rehoboth, then Seekonk, and finally East Providence, Rhode Island in 1862 (R.I. Historical Commission, 1976, p. 15). Part of this early settlement included the "Ring of the Greene" or "Ring of the Towne," which was an area of open space of 200 acres serving as the town common and as grazing land. Historians have located the "Ring" in roughly the area of Greenwood Avenue, Bourne, Holt, Pawtucket and Bishop Avenues and Pleasant Street. The Hyde Bridgham house at 120 Pleasant is one of at least five houses that once fronted the "Ring" (R.I. Historical Commission, 1976, p. 11).

Zoning, Density. Perhaps because of the desirability of the area as a residential portion of the City, it has been zoned for high density residential use. The Bridgham Farm site itself is in a Residential 2 zone, which allows lots of ten thousand square feet with twenty-five foot side

yards, front yards and rear yards. This allows a density of four houses per acre, which is quite high with little space between homes. The R-2 density is lower than the abutting area, which is zoned Residential 4 and calls for five thousand square foot lots with eight foot side yards, fifteen foot front yards and twenty foot rear yards. This density is eight houses per acre. Homes in the area are small to moderate in size and give the neighborhood its middle or upper middle class character.

There is a golf course on the Ten Mile River not far from the Bridgham Farm Site, and the East Providence High School is also nearby. There is extensive retail shopping about two miles south of the site on Pawtucket Avenue.

Roadways. Such high density combined with the activity of the area does produce substantial traffic. Traffic studies have been performed by two different consultants, one for the developer and one for the neighborhood group. These studies analyze the capacities of the existing road system in terms of the volume they can handle. Then additional traffic generated by the project and the general growth of the area are introduced into the model to ascertain the effects on levels of service. Levels of service with regard to traffic range from A to F. Level A provides free flow with no delays, while Level F means a traffic jam. Level C, which means stable flow with average traffic delays is desirable for the design of new facilities (Rizzo Associates, 1987).

The road system is shown in Figures 2.1 and 2.2. Two major routes pass near the site. The first is Pawtucket Avenue (Route 114/1A) which is a north-south arterial providing two travel lanes in each direction with a speed limit of thirty-five miles per hour. Newman Avenue (Route 152) is located approximately one fourth mile north of the Bridgham Farm site and intersects Pawtucket Avenue. It has one travel lane in each direction and provides access across the Turner Reservoir into Massachusetts. The posted speed limit on Newman Avenue is thirty miles per hour. The traffic on these routes is signal controlled.

Homes located on Miller Avenue abut the site directly. Miller Avenue is a local residential street with a posted speed limit of twenty-five miles per hour and a width of twenty-six feet. Crossing Pleasant to the west, the roadway becomes Miller Street with a width of about twenty-two feet intersecting with Pawtucket Avenue. Control of traffic is by stop sign.

Access to the site is off Pleasant Street, another local residential street which runs about one-half mile north and south between Pawtucket Avenue and Newman Avenue. This is largely an unimproved rough road ranging in width from thirty to twenty-six feet. The speed limit is twenty-five miles per hour, and traffic is stop sign controlled. In spite of the poor condition of the pavement, it is used as a shortcut to Newman Avenue.

The existing conditions for this road system as reported by Rizzo Associated show levels of service of C or better with the worst problems at the intersections of Pawtucket Avenue and Pleasant Street and Pawtucket Avenue and Newman Avenue. Automobile trips to and from the site generated by the project were analyzed for their effects on daily traffic and their effects on peak rush hour traffic. When this information was imposed on the existing volume and capacity figures, both studies concluded that the project at the site would not have a major adverse impact. As far as capacity is concerned, levels of service do not fall below C with the same intersections continuing to slow down and with the intersections of Pleasant Street and Newman Avenue dropping from level A to level B. During the morning and evening rush hours, however, it should be noted that the intersection of Pawtucket Avenue and Pleasant Street will experience level of service E at afternoon peak rush hour with or without the proposed development.

Background. The Site.

Physical Characteristics. The parcel which has been purchased for development contains 21.26 acres. As the study area map shows (Figure 2.2), it lies east of Pleasant Street, north of Miller Avenue and west of a fifty foot strip of City owned land along the James V. Turner Reservoir. The Reservoir itself is at forty-nine feet above sea level, and the topography of the site ranges from fifty feet above sea level closest to the reservoir to sixty feet

above sea level at the western edge. This slope is one to two percent and considered to be a flat slope.

In a 1962 Inventory of Forest and Wetland Vegetation Types of Rhode Island performed by the University of Rhode Island, the site is shown as agricultural land. It can now be classified as an abandoned field covered by grasses, shrubs and small trees with larger oaks, pines and maple trees on the perimeter. Such a system provides a good habitat for small animals such as foxes, rabbits, squirrels, mice and many birds.

A preliminary soil analysis revealed the entire parcel to be Merrimac (MmB), a sandy loam. This soil is capable of growing corn, potatoes, alfalfa and hay. The City of East Providence has approximately 915 acres of MmB out of approximately 8,600 total acres (U.S. Dept. of Agriculture, Soil Conservation Service). It is suitable for building for many reasons. First, the depth to the water table is generally greater than six feet. The water table is the upper limit of the soil underlying rock material that is wholly saturated with water. Also Merrimac's depth to bedrock (layer of solid rock) is generally greater than sixty feet. These characteristics offer slight constraints for building dwellings and streets and for seeding lawns and other landscaping. In terms of recreation, Merrimac offers only slight constraints to camping, picnics, playgrounds, paths and trails and golf fairways.

As to hydrology, Merrimac is in hydrologic soil group A. This grouping is a means of identifying soils for their runoff producing characteristics. Group A soils have a high infiltration rate when wet and a low runoff potential. The permeability, or rate at which it allows water to percolate through, is two to six inches per hour, and it has a low shrink, swell potential.

History. As mentioned in the description of the Rumford Neighborhood, the houses and accompanying structures of Old Bridgham Farm are on the National Register of Historic Places. The main house was built in 1767 by Ephraim Hyde, pastor of the Newman Congregational Church. It was purchased by Dr. Joseph Bridgham of Boston in the 1780's and later used by his son Samuel who served in State House of Representatives, was State Attorney General and the first mayor of Providence. The house is still owned by Bridgham descendants (R.I. Historical Commission, 1976, p. 71). The farm was at one time very large, including what is now the Turner Reservoir and Seekonk, Massachusetts High School.

The special place which the old farm takes is apparent in the perspective of the Rumford Neighborhood and the City itself. Its history, and its undisturbed serenity along a water body have made it a unique, sensitively balanced, nearly hidden treasure for those lucky enough to enjoy it. This, together with the buildable characteristics in an excellent location, make it a gem for the developer, the

likes of which is not often seen. Any proposal for the site must proceed with a deeply rooted awareness of this balanced sensitivity.

The Robbins Proposal. The developer interested in building on the site is The Robbins Group, a firm based in Cambridge, Massachusetts. The most prominent characteristic of their proposal is the use of cluster housing. As the term implies, this is housing which is grouped together with individual units sharing common floors, walls and ceilings. It is certainly not a new concept, as is evident in its use by Pueblo Indians and other cultures further back in time.

In today's planning and design, clustering of units represents a bit of middle ground between the detached single family homes of the suburbs and the urban structure which often appears totally isolated from the land itself (Untermann, 1977, p. 1). By grouping buildings in more creative ways than a traditional grid pattern, there can be more common open space left. Through careful design, the desired elements of privacy, open areas and community can be achieved at densities higher than in single family neighborhoods (Untermann, 1977, p. 1). The concept can also reduce road costs and construction costs as well as allow greater flexibility in design.

The Robbins Group is calling for seventy-three two bedroom townhouses to be contained in clusters of one, two and three buildings for a total of 28 buildings. Open space is to be maintained between the buildings and special

concern will be given to the abuttors on Miller Avenue. Because of the already dense configuration there, thirty feet will be conveyed from Robbins to the abuttors on Miller Avenue with certain restrictions. In addition, a one hundred foot buffered berm will be placed between the thirty foot strip and the remainder of the Robbins property. The berm, or mounded up area, will be vegetated in a way which it is hoped will be compatible with the existing vegetation. The road system within the development will be curvilinear.

The breakdown of spaces for the site begins with a total of 20.28 acres (this is without the .98 acre strip to be conveyed to the abuttors). Common open space will comprise 12.67 acres or 62%, and 2.23 acres or 11% will be covered by buildings. Roadways and driveways will cover 5.38 acres or 27%.

In order to comply with East Providence's zoning ordinance, Robbins will apply for a Residential 5 designation with a PUD overlay. A PUD is a planned unit development. This type of development means a contiguous parcel is developed according to an overarching design plan. It usually contains a mixture of uses such as multi-family dwellings and commercial buildings for the benefit of the residents. Planned unit developments in East Providence may be accomplished through the use of an overlay district on a Residential 5 or a Commercial 1 zone. The most simple explanation is that Robbins proposes taking its cluster proposal and superimposing it on a Residential 5 (R-5) zone,

thereby making it necessary to meet both the R-5 requirements and the requirements detailed in the overall scheme for the planned unit development.

This type of zoning is a form of performance zoning. Through this method, a use is permitted on a site if it meets certain pre-determined criteria for the general health, safety and welfare of the community. In other words, a development is evaluated in terms of the way it is expected to perform on a site. This method gives strength to the planner by creating a yardstick against which to measure a proposal and gives greater flexibility of design to the developer. The methodology is discussed in greater detail in Chapter III.

Evaluation Techniques. This background information gives the necessary viewpoint from which some sense of the value of the site can be derived. The following section applies three of the evaluation techniques described in Chapter I.

The contingent valuation method, the effectiveness in controlling runoff and the value of the site as part of an open space network are applied, and the findings discussed. Conclusions are then drawn regarding the usefulness of the techniques and the value which can can be assigned to Old Bridgham Farm.

Localized Value. The contingent valuation method was applied in order to ascertain information regarding the value of the site in the eyes of the abuttors and neighbors.

A survey questionnaire was developed and is included in Appendix A. Unfortunately, the textbook description of the use of the contingent valuation method does not take into account the volatility of a sensitive area.

In this case the developer was proceeding very cautiously, trying to appease the neighborhood which had become organized in reaction to the sale of the farm. Several meetings had been held over a one year time span and negotiations were continuing. Walking into this situation, it became difficult to administer a questionnaire based on open space issues, because neither side wanted to see the work of a year's negotiations undone.

As a result, the questionnaire was administered unscientifically by being handed out at a meeting with a request that it be returned to the leader of the neighborhood group. This did not guarantee an adequate return, and the results of the survey are somewhat anecdotal and observational.

The highest value of the site at the local level is its existence value and preservation value. In other words, to those who are nearest to it, the farm should remain as it is, simply because it exists and is worthy of preservation. Other responses which were observed are that the farm is priceless and that it is a remarkable animal habitat. As might be expected, there is a great deal of territorialism and protectionism attached to the farm site.

Controlling Runoff. As explained in Chapter I, the 208 Water Quality Model provides a means of calculating runoff in watershed areas. Since the site examined here is a small one, the model could have been less than accurate. It does, however, give a clear picture of the runoff situation on the site. The Model was applied to three scenarios for the site. The first was in its current undeveloped condition. Next, a residential scenario with 63 single family homes at a density of 10,000 square foot lots was analyzed, and finally the Robbins proposal of 73 clustered units was examined. The calculations are shown in Appendix B, and the results are discussed here.

In the first scenario, it was assumed that there was no development on the site. Therefore, all 21.26 acres were considered to be pasture land in good condition. A rainfall event of five inches was used. The problem encountered was that the runoff from a site in this condition was so low that it was not included in the Model's runoff table. However, interpolation produced the result of one-half inch of runoff from the site in its undeveloped state.

Next, the 63 single family detached homes scenario was considered. For this, acreage of roads, driveways, roofs and lawns had to be calculated. Lot size was assumed to be 10,000 square feet with 25 foot front setbacks, Frontage on the street was 100 feet and road right of ways of 40 feet were used (this includes sidewalks). The breakdown is shown in the calculations. Under this scenario, a curve number

which is a reflection of the amount of rainfall running off a site was 66. When used to calculate runoff in inches, it was found that 1.73 inches would run off the site in a storm yielding 5 inches of rain.

In calculating for the Robbins proposal of 73 clustered condominiums, an acreage breakdown from the developer was used. In this scenario, there is 64% open space as compared with 53.7% in the single family scenario. The Robbins proposed scenario results in a runoff curve number of 60, yielding 1.3 inches of runoff with 5 inches of rainfall.

Peak discharges were also calculated for each of the scenarios. This is the highest amount of runoff during a storm event. In areas with more impervious surfaces, this peak is reached much more quickly than in pervious areas. In highly developed areas, nearly 100% of the rainfall runs off during the first hour of a storm. The amount is calculated through the use of the 208 Model, which includes factors influencing the discharge. In this case slope was included. The result gives peak discharge in cubic feet per second.

Again, for the undeveloped scenario, interpolation gave a result of less than 5 cubic feet per second. For the 63 single family scenario, the peak discharge was 21.5 cubic feet per second. The Robbins proposal showed a peak discharge of 14.51 cubic feet per second.

These differences do not seem significant unless several other factors are included in the analysis. First,

all of the runoff from this site will drain toward the Turner Reservoir. It is not now a source of drinking water, although it has been in the past. It is an important water body for its visual value and its potential future use. Degradation of water quality must be prevented, and the fact that it has no use as an immediate public water supply is not an excuse to allow its pollution.

The site is sewered, so that most storm water would be directed off site to treatment. However, simple calculations reveal the deposition rates generated on site by automobile use. The model used in these calculations is the Shasheen Model developed in 1974. This model applies constants for roadway deposition and results in a figure in pounds deposited per year.

Calculations were performed for grease, total phosphate, nitrate, chloride, lead, copper and zinc using the Robbins proposal as a hypothetical case. The actual calculations are shown in Appendix B. Notice that 4.86 pounds of grease would be deposited per year, .46 pounds of phosphate, 8.92 pounds of lead and 1.12 pounds of zinc.

The results of this runoff analysis are not surprising. The scenario which has the least impact on water quality is the current grassy, undeveloped condition. It is followed in increasing severity by the clustered concept and the single family detached development. Although the differences in runoff amounts and peak discharges for the two developed scenarios do not seem significant, they take

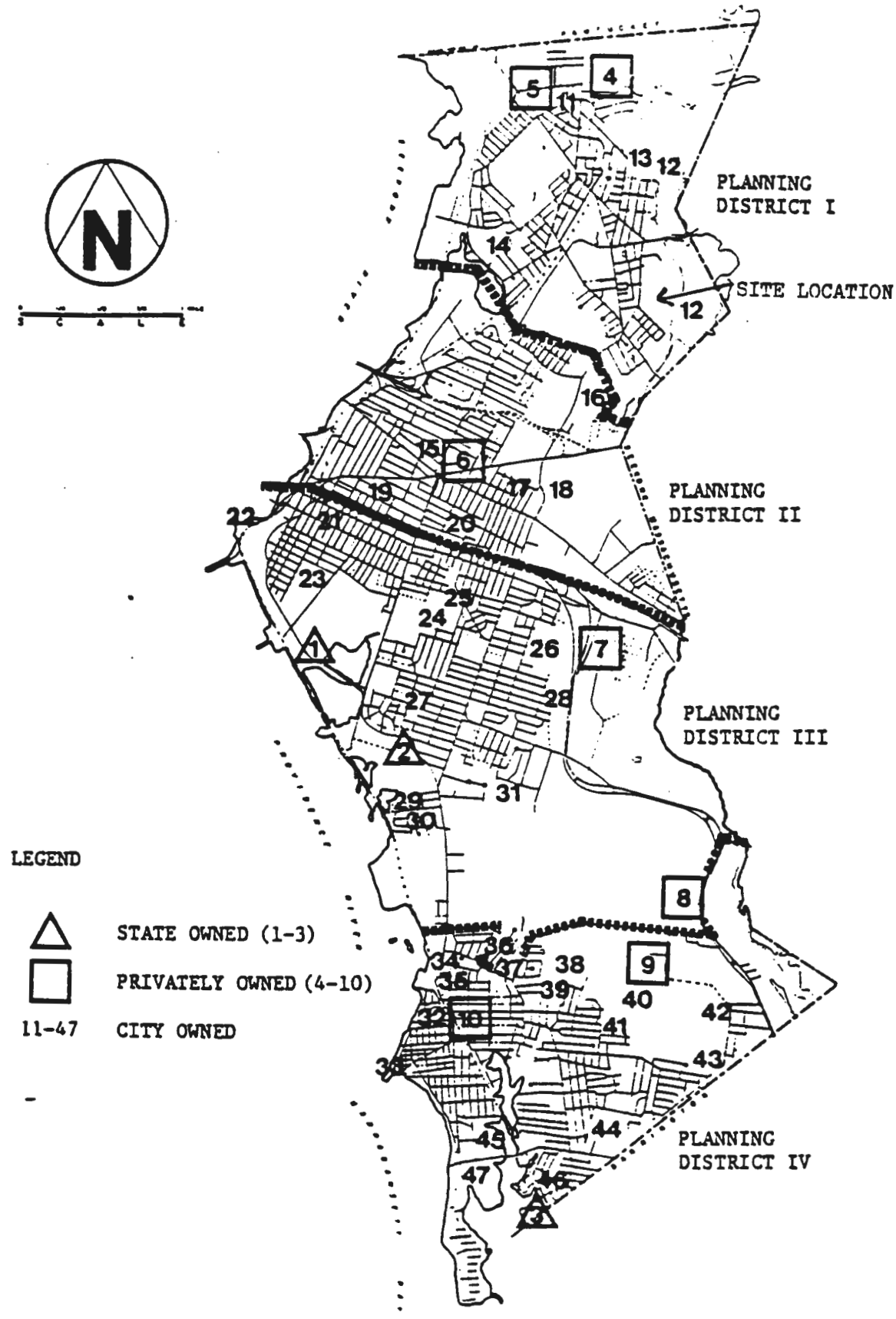
on more importance in light of roadway pollutants potentially reaching Turner Reservoir and causing degradation of water quality. The conclusion regarding runoff control is that the site is most valuable in its undeveloped state as a means of preserving water quality.

The Role in the Open Space Network. As mentioned in the 'Background' section of this chapter, East Providence provides the usual variety of recreational opportunities for its residents. The Master Plan for Parks, Recreation and Open Space was adopted in 1962 and is amended and updated periodically, most recently in 1985. Standards developed at the time of adoption still apply and call for 2.5 acres of combined playfields and playgrounds per 1,000 persons in the area served. The play areas are to be located within one-half mile of a neighborhood. Beyond that there were to be 7.5 acres of parks and other recreation facilities per 1,000 persons in the entire City. Also at that time the City had 135 acres of public recreational facilities and 411 acres of semi-public and private facilities for a total of 546 acres. That total did not include 383 acres which were then used for water supply and were targeted for recreational use when water use ceased.

The City's public, private and conservation and open space areas are shown in Figures 2.4 through 2.6. Planning Districts have been designated for work purposes. The location of the Bridgham Farm site is shown on each map in Planning District I. Current information shows that East

Figure 2.4

I RECREATION AREAS OPEN TO THE GENERAL PUBLIC



Source: Department of Planning and Urban Development
East Providence, Rhode Island

I RECREATION AREAS OPEN TO THE GENERAL PUBLIC

State Owned △

1. Veterans Memorial Parkway
2. Squantum Woods Memorial Park
3. Haines Memorial State Park

Privately Owned □

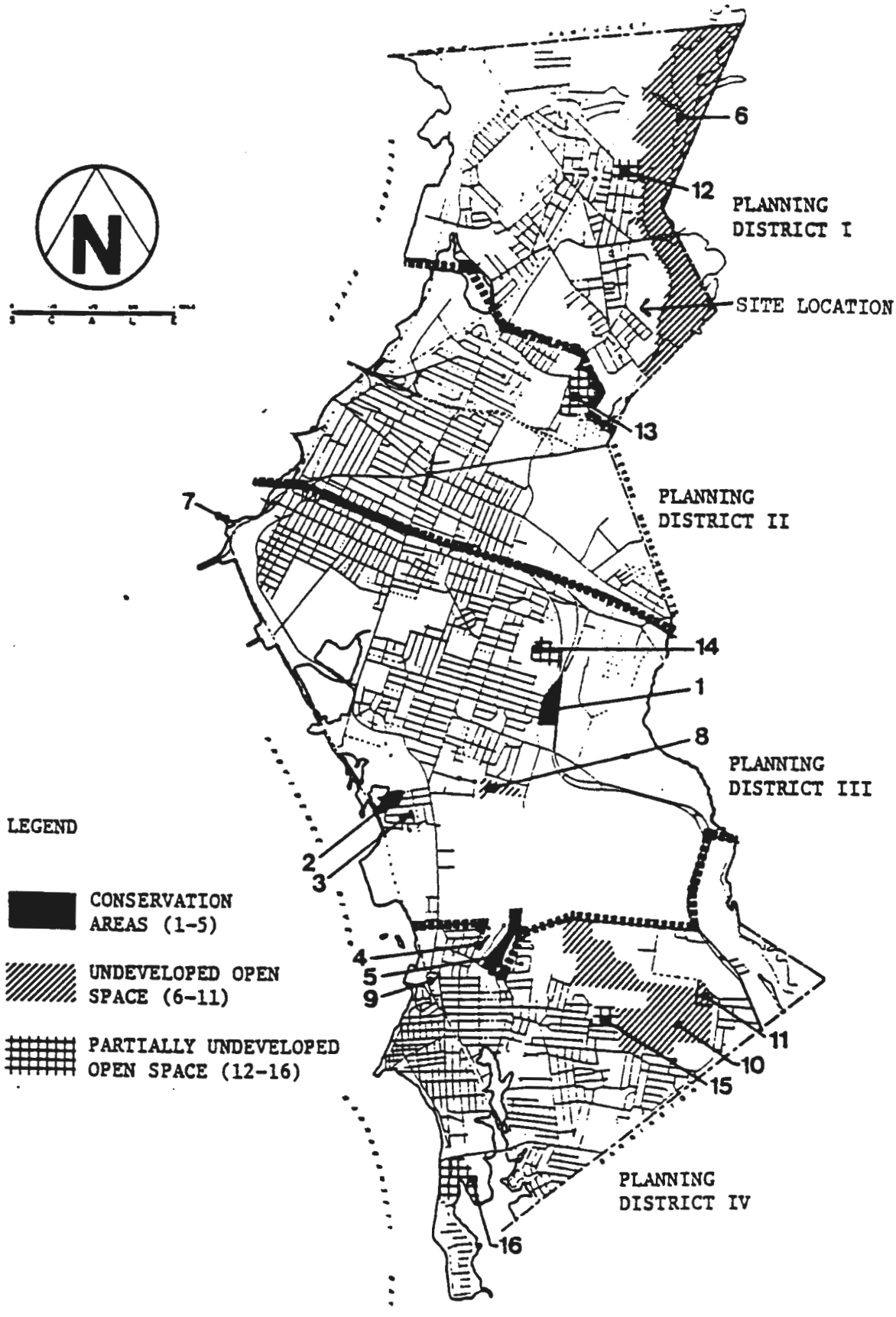
4. Brunswick East Providence Lanes*
5. United Skates of America*
6. Bowling Academy Inc.*
7. Tennis R.I. Club*
8. Riverside Little League Fields
9. Centre Court Tennis Club*
10. Riverside Recreational Bowling Center*

City Owned

11. Bourne Neighborhood Park
12. Turner Reservoir-Central Pond
13. Rumford Playground-Thompson School
14. Glenlyon Playground
15. Central Avenue Playground
16. Agawam-Fynn Playground
17. Martello Street Neighborhood Park
18. East Providence Senior High School
19. Weaver Memorial Library
20. Hull Street Playground
21. Mauran Avenue Neighborhood Park
22. Compassionate Friends at Bold Point Park
23. Pierce Stadium and Playground
24. Brightridge - Rosegarden Neighborhood Park
25. Martin Junior High School
26. Kent Heights Playground
27. Silver Spring Playground
28. South Boyd Avenue Conservation Area
29. Boyden Heights Conservation Area
30. Mohawk Avenue Conservation Area
31. Tripps Lane - Bay View Park
32. Lincoln Avenue Park
33. Sabin Point Neighborhood Park
34. Riverside Community Center
35. Ailanthus Avenue Park
36. Lakeside Conservation Area
37. Willett Pond Conservation Area
38. Riverside Junior High School
39. Delle Femine Playground
40. Southeast Drainage District
41. Meadowcrest Playground
42. Estrelle-Reardon Park
43. Grassy Plains Neighborhood Park
44. Waddington Neighborhood Park
45. Bullock Point Playground
46. Vintner Avenue Neighborhood Park
47. Carousel Park

* User fee required

Figure 2.5
II CONSERVATION AREAS AND OPEN SPACE



Source: Department of Planning and Urban Development
East Providence, Rhode Island

Conservation Areas

1. South Boyd Avenue
2. Boyden Heights
3. Mohawk Avenue
4. Lakeside
5. Willett Pond

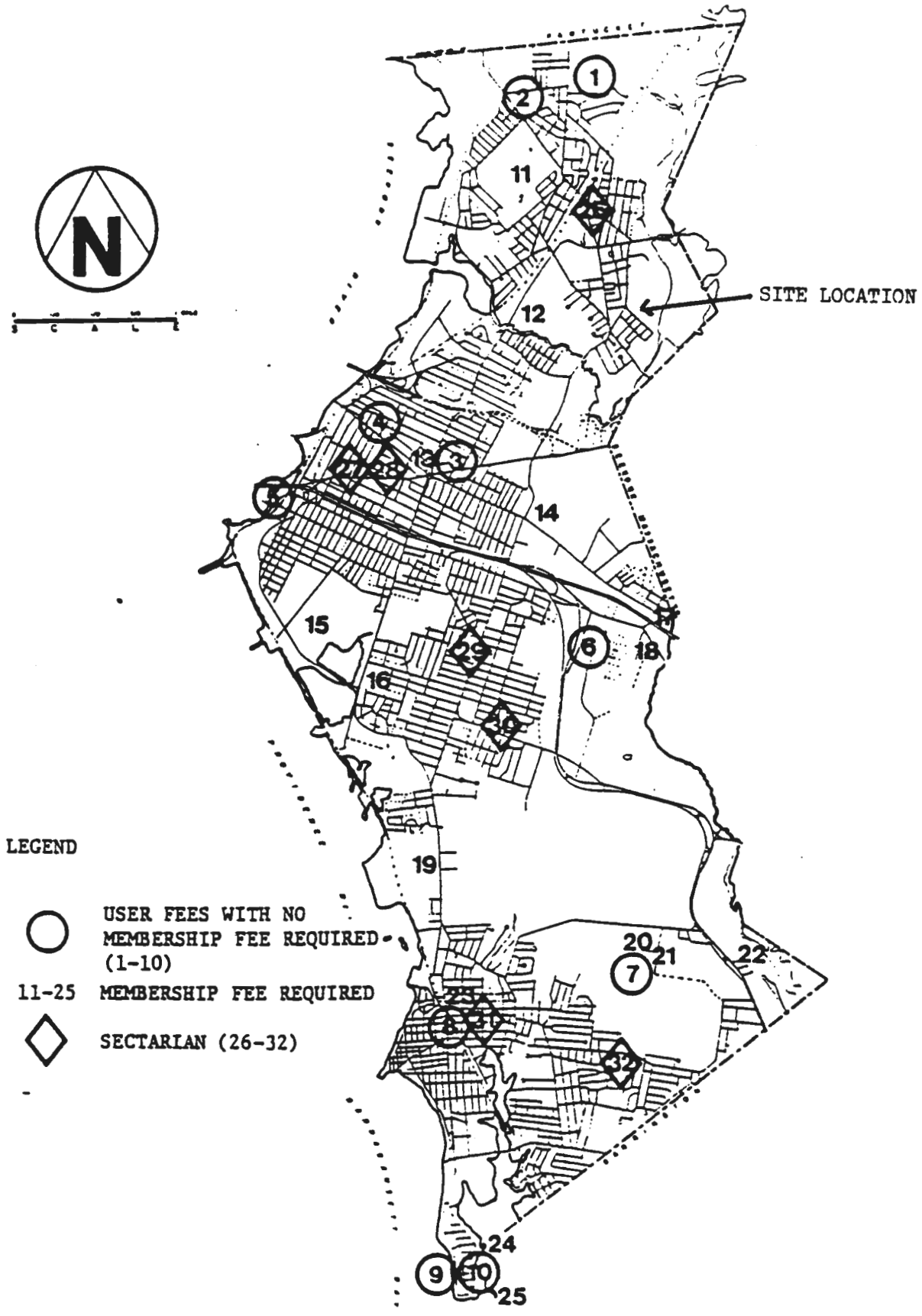
Undeveloped Open Space

6. Turner Reservoir - Central Pond
7. Bold Point
8. Tripps Lane - Bay View Park
9. Ailanthus Avenue Park
10. Southeast Drainage District (landfill)
11. Estrelle - Reardon Park

Partially Undeveloped Open Space

12. Rumford Playground - Thompson School
13. Agawam Fynn Playground
14. Kent Heights Playground
15. Meadowcrest Playground
16. Carousel Park

Figure 26
LII PRIVATE RECREATION FACILITIES



Source: Department of Planning and Urban Development
East Providence, Rhode Island

III PRIVATE RECREATION FACILITIES

User Fees with No Membership Fee Required ○

1. Brunswick East Providence Lanes
2. United Skates of America
3. Bowling Academy Inc.
4. Indoor Tennis Inc.
5. Oyster House/East Providence Boatyard
6. Tennis Rhode Island Club
7. Centre Court Tennis Club
8. Riverside Recreational Bowling Center
9. Narragansett Terrace Boatyard
10. Bullocks Point Boatyard and Marina

Membership Fee Required

11. Wannamoisett Country Club
12. Agawam Hunt Country Club
13. East Providence Boys Club
14. Providence Country Day School
15. Metacomet Country Club
16. Gordon School
17. Rhode Island Nautilus Center
18. Playoff Racquetball Club
19. Silver Spring Golf Club
20. Massasoit Gun Club
21. Kendbrin Swim and Tennis Club
22. Riverside Sportsman's Association
23. Riverside Boys Club
24. Narragansett Terrace Yacht Club
25. Narragansett Terrace Park

Sectarian ◇

26. St. Margaret's Church
27. Sacred Heart Church
28. Haven United Methodist Church
29. St. Martha's Church
30. Hope Congregational Church
31. St. Brendan's Church
32. Covenant Congregational Church

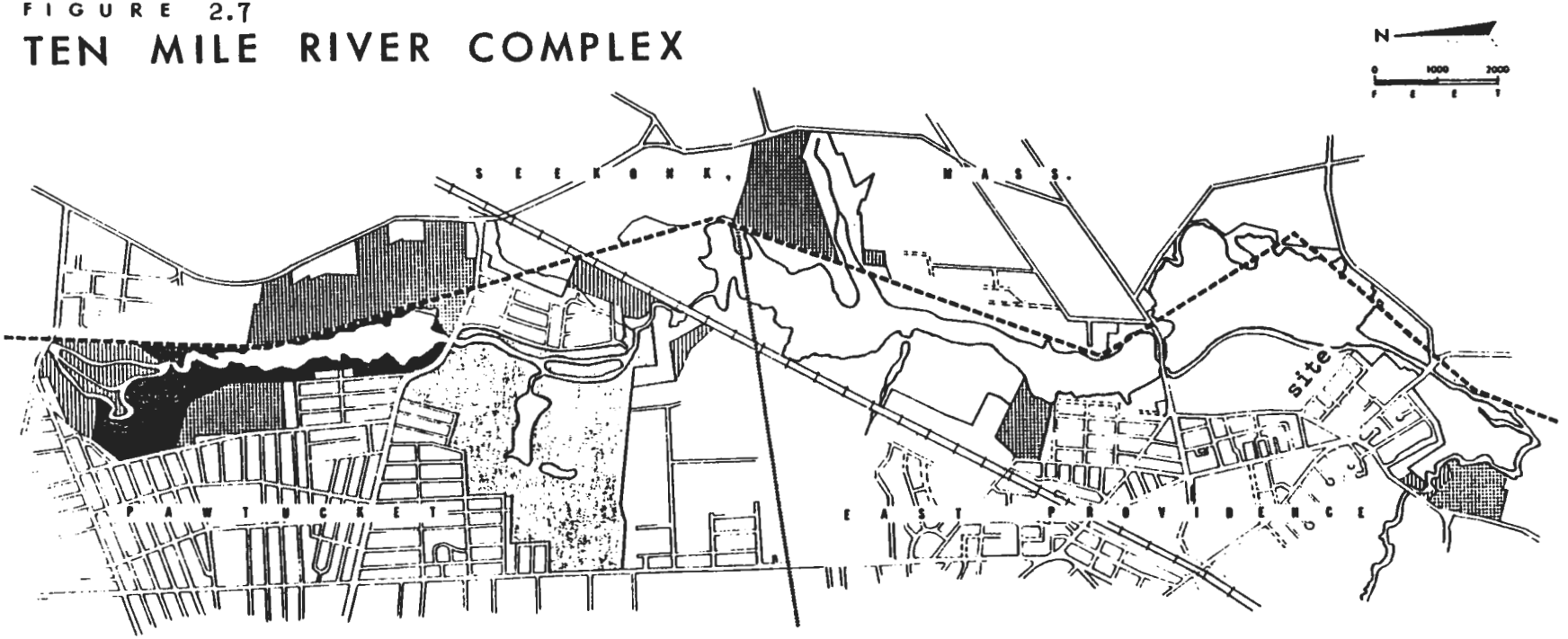
Providence has been able to apply the standards developed for the 1962 Plan. According to the Statewide Comprehensive Outdoor Recreation Plan 1986-1991, prepared by Rhode Island Statewide Planning, the City provides 18 acres of public recreation and open space per 1,000 persons. This amount is far ahead of the amounts in other large cities within the state. Cranston, for example provides 4 acres, Pawtucket 4, Providence 6 and Warwick 10.

According to the 1985 Amendments to the Open Space Plan, the location of facilities within one-half mile of neighborhoods is adequate in Planning Districts I and IV, with some problems noted in Districts II and III. According to projected needs for 1990, no acquisition is needed and logistic problems of location can be solved through providing safe access to facilities located slightly further than one-half mile.

The relationship of the Bridgham Farm site in relation to other areas of undeveloped open space can be seen by studying Figure 2.5. Occupying its position along the northeast border of the City, it is somewhat set off geographically from the other open space and conservation areas. The Farm site as it ties into the Turner Reservoir complex has more of a regional network value. Central Pond lies just north of the Turner and extends north to Pawtucket, where it connects with the 193.76 acre Slater Memorial Park. Slater in turn connects with the 104 acres of Rhode Island's Ten Mile River Reservation.

FIGURE 2.7

TEN MILE RIVER COMPLEX



TEN MILE RIVER RESERVATION

PROPOSED ADDITION

SLATER MEMORIAL PARK

OTHER CONTIGUOUS PUBLIC AND SEMI PUBLIC OPEN SPACE

EAST PROVIDENCE WATERSHED

DEPARTMENT OF PLANNING

CITY OF EAST PROVIDENCE, R. I.

This network is shown in Figure 2.7. The City has long recognized this value, calling the Turner a prime potential for freshwater swimming and a natural recreation area. It has zoned the Turner itself and several land masses in the area as O-1 or Open Space, requiring minimum lot sizes of 100,000 square feet, limited to two story buildings 30 feet in height covering 10 percent of the lot. Uses which fall into the Open Space category include farming, conservation districts, historic areas, hunting preserves, parks, watersheds and water supply lands, camps, golf courses and sportsmen's clubs.

With access to waterfront areas a major concern, access to the Turner would be a major accomplishment. Efforts were made in the past by the Cities of Pawtucket, North Attleborough, Seekonk and East Providence to obtain funding to provide a system of bikeways and walkways. If it were implemented, this regional system would be a continuous park system of over 810 acres. So far, priorities, lack of personnel to perform the necessary planning studies and lack of funding have prohibited the plan from going forward.

As far as the Farm site itself is concerned, its role in the regional park would be small. Given the makeup of the neighborhood, it is doubtful that the entire site would be included as part of the network. The 1975 amendment to the Recreational Master Plan did call the Farm "the primary site for a major city park." However, extensive recreation facilities with the accompanying parking facilities would be

a very disruptive influence. Neighbors are not receptive to noise and traffic, and the access currently available to the Farm site is narrow. The abutting parcel also remains open and would be more valuable as a major city park, because of better access. This proposal, however, would undoubtedly meet with as much opposition as the Robbins proposal has encountered.

In addition, the sales price for the 21.26 acres was 1.8 million dollars in 1986. This would certainly be beyond the City's reach without additional funding. The best recreational use in the area would be as a trail for bicyclists and walkers coming from the larger park areas to the north. The City already owns about fifty feet along the Turner Reservoir in the Bridgham Farm area. At most an additional acre or two could have been purchased to provide a picnic area and possibly an additional few yards to create a wider path. However, the goals of the Ten Mile River Reservation regional parkway with a trail system along the reservoir can still be recognized.

Conclusions. The three techniques applied in analyzing Old Bridgham Farm were each useful for different reasons. First, the contingent valuation method as it was applied served to elicit quite an emotional, heartfelt response regarding the site. It brought out some of the characteristics of the site which can only be recognized by those who see it every day. The value derived through the use of this survey based approach was that such areas are

important for their existence value. In other words, the fact that such open areas exist and provide wildlife habitats is reason enough to preserve them.

The main goal of the approach, which is to derive an actual dollar figure representing the value of the site was not accomplished. The reasons are two. First, the land here is not public land, and the use of it by abuttors has been a free rider situation in which they were, in a sense, allowed to trespass. This type of unique opportunity does not lend itself to the use of the contingent valuation approach, which is unfortunate because it means that abuttors' viewpoints are not included in a true evaluation. This issue is discussed in Chapter IV. Had the decision here been more of a public one, such as whether to turn a public park over to development, then the approach would have been more appropriate.

The second reason the approach was less than effective was that the situation here was a heated one, which did not lend itself well to an interview situation. This coupled with the limitations of a single researcher working in a restricted time frame resulted in an unscientific administration of the survey questionnaire. The results were more observational and anecdotal and certainly not quantitative. They did, however, have importance in revealing personal sentiments about a long treasured parcel. This personal, localized value will be impacted most by the

proposed development, and it can be said that it will be lost.

The only technique of the three which did produce actual working figures was the runoff analysis. Figures calculated in that application served to demonstrate present condition and future condition values of the site in controlling runoff and preserving water quality. This technique is useful in open space evaluation, showing in this case that an undeveloped scenario has the highest runoff control, but that in the face of development clustered units reduce runoff potential and lessen water quality degradation.

Finally, the method of fitting the site into the City's or region's open space network also proved to be a useful technique. Although there is no dollar figure or other quantifiable figure, a true perspective is gained, free from emotional overtones. In this case, a regional network of open space came to light, and it was seen that Old Bridgham Farm had a minimal role in its accomplishment and implementation. The Farm's use to establish a park is a moot point, since it has a high price tag and competition for open space funds will be high. Neighborhood resistance also presents another obstacle. The current situation is adequate to create a linked trailway around the Turner Reservoir.

The use of any of the techniques discussed in this project should be encouraged, as long as they are applied

appropriately. Since individual choice must remain operable in society, development cannot be prevented unless it interferes with the health, safety and welfare of a community. The unique situation enjoyed by the neighbors of Old Bridgham Farm is enviable, but when private land is involved changes of this sort are almost inevitable. The neighbors see the site as contributing to the quality of their lives. The developers are proposing a certain quality of life for the users of the site in a developed condition.

The conclusion regarding the physical aspects of development which can be drawn from this analysis is that controlled growth is a more workable goal than no growth. Techniques for promoting controlled growth are discussed in Chapter III. However, the underlying issue which is easier to ignore than to address is that policies now in place for making land use decisions connected with open space do not consider all necessary elements and result in poor decisions. These aspects are addressed more fully in Chapter IV.

Chapter III

Planning for Open Space

Approaches. To control growth is to allow development while imposing frameworks and methodologies on development plans which conserve and, where possible, preserve natural resources. In other words, growth management is an attempt to encourage development interests and environmental interests to be synergistic.

One aspect of controlled growth is planning for open space, the topic of this chapter. Basically, there are two approaches, each of which includes several techniques. The first is development with open space, and the second is outright preservation of natural areas. Not all of the techniques are covered. Instead, three have been chosen which have relevance to and are suggested by the study of the Old Bridgham Farm.

Development with Open Space. Performance zoning is a broad term which describes zoning requiring development to meet pre-determined standards. It is a more modern method developed in response to shortcomings of the traditional Euclidean zoning method developed in the 1920s. Euclidean or conventional zoning, (named for the court case in which the concept was first upheld, Euclid v. Ambler Realty, Supreme Court of the United States, 1926) grew in response to the haphazard growth which was occurring as industrialization began to dominate city economies and land

use. It essentially delineates districts according to uses and regulates height and area covered.

One reason Euclidean zoning gained popularity was its simplicity, the hierarchical nature of the districts separating incompatible uses and the ease of mapping it allowed. It was used as a tool for planning, which was then in the early stages of development as a profession. The earliest ordinances divided uses into three major classes: residential, commercial and industrial. Later, more discrete districts were carved out of the three major classes. The residential class, for example, could be divided into several residential districts. Some could allow single family detached units and others could allow rooming houses. A permitted use in one residential district would be seen a nuisance in another.

As time passed, however, the effectiveness of Euclidean zoning as a tool lessened. Zoning in its purest sense seeks to insulate the single family residence. Its strength to do so has waned in the face of large scale development. There are often too many zones, making each one's intent blurry. Zoning has often been administered as a reaction rather than as true policy (Kendig 1980, p. 9). The consensus reached by most experts is that strict Euclidean zoning does not address modern planning concerns. Often it is incapable of taking environmental concerns into account and results in poorly planned, aesthetically unpleasing development. It

cannot maximize the opportunities associated with physical development (Heyman 1970 p. 42).

Performance zoning moves away from the sorting of land based on the predicted effect of its use toward the evaluation of the performance of a use on a site. Uses are permitted as a matter of right, however, selected performance standards are used to protect the general health, safety and welfare. They are based on systematic inquiry of the natural functions and other important features and the degree to which development must be restricted in order to protect them (Connor, 1981, p. 295). Selected criteria pertaining to a site are chosen. A proposed use which meets the selected performance criteria may not be refused a permit (Kendig, 1980, p. 281). This affords more freedom to the developer and, more importantly, gives strength to the planning authority. This strength arrives from the specificity of the pre-determined criteria, which are a yardstick against which developers must measure their projects. Planning can follow these guidelines rather than working on an ad hoc basis. The level of performance is inherent in the standards.

As an example, instead of imposing a use designation such as commercial or residential, performance zoning regulates development based on variables which have a foundation in environmental protection. Examples include the open space ratio, the impervious surface ratio, the density factor and the floor area ratio. Districts are

delineated, each of which has certain performance standards. A proposed use which complies with the standards will be allowed. The number of districts will be smaller than in conventional zoning, but the number of uses allowed could be larger (Kendig, 1980, p. 77).

The open space ratio reflects the amount of land on a site which is left undeveloped and is designated as open. It is found by dividing the acres of open space by the total acreage of the site. By requiring a certain amount of open space to be included on a site, resources such as ground water aquifers can be protected with assurance that building will not occur over them (Kendig, 1980, p. 26). Recreational and wildlife habitat benefits of open space can also be maintained. Conventional zoning usually considers open space in terms of front, rear and side yards and not in terms of resource protection.

Ratios of impervious surfaces are calculated in the same way. The total amount of surface which does not allow rain infiltration (driveways, roads, etc.) is divided by total acreage for the site. The importance of limiting impervious surfaces and thereby controlling urban runoff should be a consideration in zoning ordinances.

Density in conventional zoning is indirectly imposed by prescribing lot sizes. In performance zoning, density, or the number of dwelling units per acre is explicitly stated. Again, it is found by dividing the total number of dwelling units by the total acreage. This gives a gross density, but

it should be refined by using only the portion of the site which is buildable. This is called net density or the density factor. The density factor is a better reflection of the physical characteristics of the site (Kendig, 1980, p. 28).

Floor area ratio applies to non-residential uses and measures the amount of building space in relation to the size of a site. Using precisely the same method of calculation, it is found by dividing the area of all floors of a building by the total acreage. It is a measure which does appear in conventional as well as performance zoning, and it is a way of measuring impacts of certain uses.

Table 3.1 gives examples of four performance zoning districts and the requirements accompanying each. They range from least developed to most developed, and they help demonstrate the effectiveness and ease of use of performance zoning.

Table 3.1 Performance Zoning Districts

District Name	Wilderness	Estate	Development	Urban Core
Maximum Gross Density	0.07	0.48	1.59	10.50
Density Factor	3.50	0.96	4.83	14.00
Open Space Ratio	0.98	0.50	0.67	0.25
Impervious Surface Ratio	0.01	0.08	0.80	*NA

Source: Kendig 1980
*NA=data not available

The difficulty in the implementation of performance standards comes in the actual development of the standards themselves. They must be developed through the use of a certain degree of expertise regarding the environment and the municipality in question. Citizens must have faith in the ability of the community to set standards properly. "You need to relate the standards to the development needs of the community. If you write it right, it's as easy to follow as a cookbook." (McElroy, 1986, p. 205). If performance standards are reasonable, they should stand up in court (Brower et al, 1984, p. 111). Problems would arise if the standards were too vague or were not applied uniformly.

Once developed and put in place, they should be effective in protecting designated areas, provided they are administered properly (Brower et al, 1984, p. 110). Such administration is not beyond the abilities of most planning departments and can lead to easier negotiations between developers and planners. The planners have clearer concepts of the development which can occur on a site and the developer has more flexibility in designing a project which works with the physical characteristics of the site.

Planned Unit Development.

The East Providence zoning ordinance is basically a traditional Euclidean one based on use districts, however it includes provisions for Planned Unit Development and Cluster Residential Development, both of which apply certain

elements of performance zoning. A Planned Unit Development (PUD) is a tract of land which is absolved from conventional zoning to permit clustering of residential uses and often a mix of other uses. Major objectives include control of density, reserving open space in a different way than the front yard/back yard approach, effective landscaping and an overall improved use of undeveloped land than is afforded by lot to lot development (Wright et al, 1982, p. 730).

Objectives of the East Providence PUD section of the zoning ordinance include the following: to provide flexibility in design and diversity in the location of structures; to promote the preservation of natural scenic qualities of open space, of existing landscape features, of site amenities, of recreational opportunities and of historic features; to promote greater flexibility and consequently more creative and imaginative design for residential and mixed use areas and to assure a harmonious, safe and beneficial relationship between the planned unit development and adjacent areas.

A PUD is only a performance zoning method when provisions for it are incorporated into the city or town's zoning ordinance and subdivision regulations. The language which accomplishes this should set out specifically not only the uses which can occur, but must include specificity of detail with regard to criteria. It should be specific to the level of including the open space ratio, floor area ratio, impervious surface ratio, use, intensity of use, site

capacity calculations, buffer space calculations, resource protection and transportation considerations. When that is done, the municipality has greater control over the type of development which can occur. This contrasts significantly with the case of the developer bringing his/her version of a PUD to the city hall and seeking a zone change so that it can be implemented. That is simply traditional zoning with a different type of variance being sought.

Though PUD is basically a simple concept, a certain degree of planning expertise is necessary for a jurisdiction to administer it properly. A specific PUD ordinance should be created under state enabling legislation. Once operable, proper site plan review must occur to ensure compliance. Developers who enjoy the flexibility of design afforded by PUD are often frustrated by lengthy review processes. A well trained professional planner can help streamline the process.

Other resistance to PUD can come from homeowners who object to mixtures of uses or to deviations from traditional single family detached dwellings. Common open space in residential PUDs and the concept of homeowners associations are sometimes not immediately accepted. When properly developed and implemented, however, a PUD can be an effective asset serving a variety of commercial needs and providing a variety of housing types.

Cluster Subdivisions.

The concept of cluster housing is a microcosm of the PUD concept. Cluster development refers to strictly residential housing which is grouped together in a way which allows provisions for open space and can be more economical for the developer. The goals of the cluster residential section of the East Providence zoning ordinance are very similar to those of the PUD section. The difference is that commercial uses are permitted in PUDs but only residential uses and related accompaniments such as clubhouses and storage buildings are permitted in cluster residential development.

By clustering the development, the number of allowable units (based on traditional zoning density) are built on the portion of the parcel which is most suitable for development. The remainder of the parcel is left as open space. There are several distinct advantages associated with using the cluster concept. These include the preservation of open space, as well as vegetation, scenery and natural drainage systems. Additionally, marginal land can be developed because less acreage is needed for structures, and those areas which are not well suited for development will simply be left as open space under the cluster concept.

Cluster development allows for reductions in lot sizes specified under traditional zoning codes. However, it is very important to note that the overall density of a cluster

development does not exceed what the overall housing density would have been under a traditional subdivision scheme. For example, if there is a 40 acre parcel zoned for one dwelling unit per acre, then 40 single family units could be built. Under a cluster scheme, only 40 units would be built, but they might occupy only 20 acres of the parcel. To allow such an arrangement, cluster development usually allows multi-family units.

One of the greatest advantages of clustering is that it reduces street and utility lengths, thereby allowing development to occur at less cost than for a traditional subdivision. Since there are common walls shared by multi-family dwellings, plumbing and electrical connections can be shared, reducing material and labor costs.

Reduced street lengths also mean savings for the municipality. Since roads are traditionally dedicated as public rights of way, they are not taxed and do not yield revenue for the municipality. However, under cluster zoning, much of the land which would have been used for roads is preserved as open space, which can be taxed. Additional municipal costs are reduced by a decreased need of road maintenance. This is especially true if natural drainage can be preserved, decreasing infrastructure costs on those roads which are built.

Communities can gain tax revenue from preserved open space in two ways. The municipality can tax each lot based on its size and value, and can then tax the open space by

assessing the homeowner's association (HOA) which holds title. The HOA in turn taxes homeowners through their membership. As an alternative, the municipality can also tax each lot based on its increased value, which theoretically rises due to its proximity to the open space. The open space remains untaxed under this second scheme (Builder Magazine, 1978).

In a 1976 study, the National Association of Home Builders (NAHB) concluded that cluster housing units could be built for a 66% savings over traditional units (Sanders, 1980). This savings can be taken off the selling price of a unit, or used to build additional amenities such as a fireplace or recreation room.

Although the benefits of cluster zoning are numerous, it is not always easy to implement such development. One of the greatest difficulties facing implementation is public acceptance of such projects. Some home buyers believe they are getting less for their money because they won't own a private lot. The public is often wary of new building styles, and it favors traditional single family homes. This attitude is unfortunate because condominiums, if clustered properly, will preserve more land and natural features than conventional subdivisions.

As in the case of PUD, specific design standards must be incorporated into subdivision regulations in order for clustering to be effective. Cluster housing, as a type of performance zoning, is an excellent method of preserving

open space and natural features while providing a housing supply equal to that of conventional subdivisions at less cost. PUD and cluster housing fit well with the approach which allows to proceed at a controlled pace.

Preservation of Open Space. The second of the two approaches mentioned in the beginning of this Chapter is the total preservation of open space without development. This is a long range approach sometimes called the "forever wild" philosophy, seeking to preserve open areas in their natural states, saved forever from human intervention. This approach can be particularly important to small, rural towns which have valuable tracts of land which should not be opened to development. The primary concern at the municipal level is funding which will help in purchasing tracts for preservation.

In Rhode Island, the source of funding which has most recently become available is the Open Space Bill passed in November, 1987. The bill was voted in by a large margin, despite accusations by opponents that the open space crisis is a fabrication. Officially entitled Public Law 1987, Chapter 425 "Open Space and Recreational Area Bonds," it calls for state bonds to be used for acquiring open space and recreational areas and for improving and restoring public recreation areas. The Rhode Island Department of Environmental Management is to administer the bond money.

The amount of the bill was 65.2 million dollars, of which 45 million is to be made available to cities and towns

in matching grants. The Department of Environmental Management is to receive 15 million dollars for its own high priority open space preservation projects, and 5.2 million is to go to specified inner city spruce up projects. As set forth in the "Rules and Regulations for Open Space and Recreation Area Bonds (1987)," the funds are to be administered by rounds with at least one round per year until all funds are expended. Funds not obligated by November 3, 1990 will revert to the control of the Director of the Department of Environmental Management for use in furthering state open space acquisitions.

Eligible applicants include land trusts and municipal agencies. There are eligibility requirements for recreation acquisition projects, recreation development projects and open space acquisition projects. Open space acquisition shall be limited to the purchase of fee simple title to or conservation restrictions over open space where such land has scenic, natural, agricultural, educational or ecological value. Eligible costs include costs incidental to purchasing land or interests in land such as costs of appraisal, survey, title search, title insurance and the purchase itself. Costs incurred prior to the approval are at the applicant's risk.

Applications will be reviewed and evaluated by the Natural Heritage Preservation Commission. The criteria applied in reviewing open space acquisitions applications are very detailed and are shown in their entirety in

Appendix C found at the end of this report. There are eleven primary scoring criteria applied to sites as follows:

1) the property provides habitat supporting or capable of supporting rare or endangered species as listed by the Rhode Island Natural Heritage Program.

2) the property is an uncommon, biologically fragile and/or critical habitat, or is a unique ecological community in the state or region.

3) the property is an outstanding representative of other ecological community types in the state.

4) preservation of the property would increase the protection of existing natural areas or enhance the linking of open space.

5) the property possesses other natural features of significance which are included under the following major groups:
Archeological Features
Geological Features
Biological Features

6) the property possesses outstanding scenic or aesthetic values.

7) the property includes agricultural land which provides good habitat diversity supporting wildlife, or the property includes 5 or more contiguous acres suitable for production of crops or livestock.

8) the property has value in flood protection.

9) the property is located in an urban or development context where its habitat, open space, scenic, and/or educational values are particularly significant, unique or vulnerable.

10) the property provides watershed protection or groundwater recharge.

11) the property is specifically identified in terms of priority, timing and cost in the local Conservation, Recreation and Open Space Plan or in a Master Plan.

The deadline for open space acquisitions applications is

June 17, 1988 with commitments to be made on September 16, 1988. Grants are to be for 75% of approved project costs.

Another source of funding is the federal Land and Water Conservation Fund Grant Assistance Program. This program was enacted in 1964 to encourage nationwide creation and expansion of high quality outdoor recreation opportunities. It covers federal acquisitions and grants in aid to state and local governments. At the federal level the fund is administered through the National Parks Service. Local governments should consult the state for administration. States must have completed a Statewide Comprehensive Outdoor Recreation Plan in order to receive funds.

There are also several notable national private organizations which work for land preservation. They include The Nature Conservancy, the American Farmland Trust, the Trust for Public Land and the Land Trust Exchange. Rhode Island has several organized land trusts and they can be effective vehicles in preserving open space.

As a land trust is a private, non-profit organization, the fiscal and legal considerations for the town are secondary. The town does not have to budget any money for purchase of land, the land trust will do its own fund raising. Some towns have found that developers are willing to dedicate either land or money to a land trust as part of their development agreement with the city or town. While the land held by a land trust is taken off the tax rolls,

the properties do not generally make demands on town services.

The legal requirements for forming a land trust entail work with a knowledgeable lawyer. The Department of Environmental Management can provide contacts. Private citizens are totally responsible for the formation and functioning of a land trust. The concept can be effective in preserving parcels of land from development, however, the common fear that huge amounts of land will be taken off the tax rolls and away from potential development is not realistic. A land trust will function to preserve a portion of land but will not seriously affect the development scene.

Controlling development rights is another method for preserving open space outright. Transfer of development rights (TDR) and purchase of development rights (PDR) are both means of controlling the density and timing of development on certain sites. The underlying concept is that a parcel of land "comes with" certain rights such as mineral, air and the right to develop. Furthermore, these rights can be separated from the land and can vest in another owner.

Purchase of development rights allows the municipality to purchase the rights to develop certain parcels. This method can be particularly effective in the case of agricultural land. A farmer may sell the right to develop part or all of his land to the town. He then retains all other rights attached to the land and can carry on his

business. The drawback is that the profits to be realized by selling the entire parcel to a developer are usually much higher than the price which can be obtained for the package of development rights.

Through transfer of development rights, control is accomplished through tradeoffs. The municipality does not purchase the land or the rights. Instead it regulates growth by allowing higher density development on one site in exchange for no development on another site. This will necessarily apply to developers who own multiple parcels.

These two approaches to open space planning, requiring development to accommodate open space and outright preservation of open space, have been used effectively; and their importance is recognized by planners and developers alike. Refinement in the process and application of both should be ongoing, and each should be used appropriately in relation to parcels under consideration.

Chapter IV

Conclusions and Recommendations

Conclusions. This Master's Research Project has examined in detail both the evaluation of open space and its preservation. Its overriding theme is that there are methodologies which can be used to evaluate open areas of land. Through evaluation, a meaningful sense of the importance of the land can be derived. Working at their best, some of the methodologies can produce actual dollar amounts, which can then be used in cost/benefit analysis in connection with the site being studied. Once this has been accomplished, appropriate steps can be taken to accommodate provisions for open space in development plans and to preserve it outright.

In the case of Old Bridgham Farm, values were derived through the application of three methodologies, the contingent valuation method, the analysis of capacity for controlling runoff and the analysis of the role the site plays in a network of open space. In this particular case, only the runoff analysis resulted in actual figures related to the site's value. Nevertheless, a good perspective of the site's value was derived.

It was determined that Old Bridgham Farm has a very high preservation value for the neighbors and abuttors. The unique situation which they have enjoyed has resulted in their considering the site as almost their own property. Beyond that, it was found that the function of the farm in

controlling runoff and thereby preserving water quality is best accomplished in its current grassy condition. In the context of an open space network, the farm is adjacent to the Turner Reservoir, which has been recognized as an excellent recreation area with the potential to be integrated into a regional park network.

Development on the site will undoubtedly have impacts relating to each of the derived values. First, the site will be irreversibly altered, and its deep-rooted, localized preservation value will be lost. Next, structures and pavement which will be built on the site will interfere with the natural filtration system currently in place. They will also take away most of the open area, which is considered so attractive. However, the development which is proposed exemplifies the modern approach to cluster housing. As such the negative impacts on the amount of open space to be preserved and on environmental quality will not be as severe as they would be if conventional subdivision methods were applied.

Third, in terms of the site's role in attempts to implement a regional network of parks, land abutting the Turner Reservoir purchased previously by the City of East Providence can still permit the implementation of a network of bikeways and trailways. Access to the Reservoir through areas to the north of the Bridgham Farm site can still be accomplished and will be more acceptable to citizens than attempting to provide park access through Old Bridgham Farm.

It is regrettable that part of the site was not preserved as an addition to the proposed Ten Mile River Complex. Since the entire parcel was purchased by the private development group before the passage of the Open Space Bill, it is too late to obtain funds for outright purchase by the City. Attempts could be made to negotiate with the Robbins Group to encourage their dedication of a portion of the site as parkland. However, in consideration of the layout currently proposed and the apparent lack of interest and funding to implement studies for the regional park, that is a not an option.

Conclusions such as this are the easy ones and the predominant ones in connection with conflicts between preservation and development. They represent an attempt at compromise, but they are closer to victories for development. In this case, open areas will remain in the clustered subdivision. However, any notion that this will satisfy the wishes of preservationists or work to their benefit is incorrect.

The open space which will remain will be re-vegetated and will take on a tailored, manicured appearance. Any remnant of the old farm characteristics will be changed over to an upscale development. As was discussed in Chapter I, spaces often speak for themselves and carry with them silent labels and messages. Just as poor quality structures can silently label their inhabitants as inferior, so will the developed Old Bridgham Farm site silently label its

residents as members of the upper class. Along with that will be a perception of exclusiveness. The open space that will remain will not be seen by the abuttors and will be for the benefit of the residents of the cluster development. The inviting private-yet-public aspects of the farm, which form the root of one of its highest values will be permanently lost.

The parties involved have attempted to avoid such a loss. Their efforts, however, have only addressed the tangible, physical impacts. The proposed development will result in less severe impacts on water quality and the amount of open space. As far as these two areas are concerned, the loss is not total. However, human perceptions and the most deeply felt personalized value connected with the site are really tossed aside. That represents a total loss in value. When there is a total loss in connection with anything, there is some degree of failure.

This failure brings up the more difficult questions which underlie the entire open space versus development issue. Human perceptions seem to have legitimacy only when they are disguised as runoff calculations or open space ratios. Why is this the case? Should it always be the case? How can public policy address the plain and simple issue of abuttors' viewpoints? Must the final decision always be a shrug of the shoulders and a realization that,

if a parcel cannot be preserved, clustered condominiums are acceptable?

The answer which is borne out in this case is that development on privately owned land cannot be interfered with beyond the protection of the general health, safety and welfare of the community. The one sided nature of this approach is ineffective. Interference should be double edged, with the ability to be both restrictive and encouraging in order to serve the social interest (Turvey 1955, as referenced in Faludi 1987, p. 155). The following section presents proposals for policy changes which will help arrive at a more equitable solution which is a truer compromise.

Recommendations. The four policy recommendations covered in this section represent answers to the questions enumerated above. They focus on the specific issue of human perceptions of open space and the role they play in decision making.

First, interference with development proposals, whether that interference is public or private is always seen as an infringement of the property rights of the private landowner. In order to be more effective, however, public policy land use decisions pertaining to open space must include a clearer recognition of the right not to be polluted or the right not to be subjected to environmental degradation.

The key aspect is the concept of externalities. These are spillover effects, and they can be positive or negative. Positive externalities could be jobs created in connection with building a new factory. Negative externalities usually receive more attention because of the harm they cause. They include water and air pollution, odors and unsightly structures.

The generation of a negative externality is an offense to society, and the damage it causes is one directional (Hite 1972, as referenced in Faludi 1987, p. 159). Current policies address these easily recognized, tangible, measurable externalities and work to control their effects through such efforts as zoning and the enforcement of clean up regulations. These measures, however, are really treating the symptom and not the disease.

The answer to solving the problem of negative externalities is to internalize the social costs. Rather than allowing pollution to continue with clean up costs paid for by public funding, polluters must pay for pollution they cause. Requiring this is not in violation of the rights of polluters to pollute, instead it is an assertion by pollutees of their right not to be polluted.

The second policy recommendation could be seen as a branch or a refinement of the first, with a closer application to development issues. It calls for a more in depth consideration of quality of life (QOL) in connection with development proposals. This consideration must truly

address quality of life in an unabashed fashion. That is to say, it should be a major variable in the forefront of required impact analyses, occupying the same position as drainage and traffic concerns. There should be no reason to mask it as something else.

To be done correctly, there must be a certain degree of expertise which will correctly define quality of life and measure the factors which contribute to it. There is a wealth of material on the subject, however, it is often relegated to a secondary level as a "softer" element of planning. Even in Impact of Growth, an excellent reference for impact analysis by Canter, Leistritz and Atkinson, quality of life appears in Chapter 6, long after economic and fiscal impact analyses are covered. At any rate, quality of life is viewed as a

> "multidimensional concept that can be measured by determining the difference between the individuals' state of being as they perceive it and their aspirations, desires and needs." (Canter et al 1985, p. 235)

It can be further defined as a

> "dynamic blend of satisfactions that differ from one person to another, can change over time and are influenced by the external conditions relevant to the valued aspects of people's lives." (Canter et al 1985, p. 236) (emphasis added)

These definitions make it evident that the quality of life is difficult to measure. It must be derived through surrogate measures.

Social indicators are such surrogate measures. They give information from which a composite quality of life

measurement can be derived. Canter et al have developed a framework for undertaking such measurements based on four categories of life needs (Canter et al 1985, p. 254). They include basic needs (income, housing); well-being needs (employment, health, safety); opportunity needs (education, transportation and information); and amenity needs (recreation, environmental quality and cultural opportunities). Indicators are then delineated which are used to measure quality of life in connection with each need. For example, indicators in the area of well being needs--health include infant mortality rate and number of hospital beds per thousand persons.

Open space would fall under amenity needs and indicators would include proximity of open space to home, time spent using open space, type of use and usefulness of open space in reducing tension and anxiety. As Canter explains further, some of these measures, particularly perceived tension reduction, are subjective or perceptual social indicators. They differ from objective social indicators, such as the numerical indicator of infant mortality rate, in their ability to explain more about quality of life.

> "The well being of cities, as described by objective social indicators alone, ...tells us nothing about the 'life quality' actually experienced by individuals...A perceptual factor directly taps the quality of life as experienced by individuals." (Canter et al 1985, p. 253).

It will undoubtedly be difficult to persuade developers and authorities of the importance of measuring perceptual

social indicators. However, they should occupy a position which is high up on priority lists, because they are at the root of development concerns. Their importance could not be better explained than by this excerpt:

> "Through the development of perceptual indicators, one can determine the aspects of life that do in fact concern individuals, and how these aspects relate to their sense of well being. It remains true that people's perceptions, however uninformed they may be are real to the person involved, and that people act on the basis of them. Consequently, attention must be given to profiling local conditions that are important to the quality of life as well as to the priorities of the residents concerning the components of the quality of life that are most valued by them" (Canter et al 1985, p. 253).

The third policy recommendation is the requirement by municipalities that developers enter into negotiations with neighbors and abuttors of the proposed projects. This is one of the most positive aspects of the Old Bridgham Farm proposal. The Robbins Group has dealt with a neighborhood group in order to listen to their concerns and attempt to resolve disputes.

This is not a requirement, but it could be. As such it could be effective in arriving at a proposal which represents some middle ground between privately optimal and socially optimal solutions. As was mentioned in Chapter II, Old Bridgham Farm represents a free rider situation in which the abuttors benefit from land they do not own. Faludi points out that the case of the

> "free rider is yet another instance of the failure of private and social decision making to coincide with one another in a common optimal solution" (Faludi 1987, p. 156).

The requirement of negotiations could be incorporated into subdivision regulations in addition to public hearings arranged by the municipality. This would certainly be opposed by developers who would speak of lost opportunity costs, however, the results could be far more effective than those currently produced.

The fourth policy recommendation does not specifically address individuals' rights or perceptions, but builds on them to develop another preservation approach. Small open spaces should be inventoried and catalogued according to their special qualities. These qualities would include unique vegetation, potential as park space, role in water quality preservation and significant and unique contributions to quality of life. Special qualities have been recognized in historic buildings and animal species, with resulting protective legislation.

By extension, simultaneously with the inventory, legislation should be passed which gives special open space a preferred status or designation. Along with this designation there should be a right of first refusal given to the city or town in which it is located. With such a scheme in place, only after the municipality has waived its right of first refusal can a sale and/or development of the property proceed.

Massachusetts has a similar procedure in connection with forest land, as mandated by Massachusetts General Laws Chapter 61. Under those provisions, land designated as

important forest land is subject to the municipality's right of first refusal before a conveyance can take place. The use of this procedure will take on even greater importance and effectiveness with funds available through the Open Space Bill.

Finally, open, undeveloped parcels present opportunities to individuals, developers and municipalities. These recommendations address the major human concern underlying the open space controversy. That is, the role which individual rights and perceptions should play. This concern must be addressed separately from purely physical concerns. No policy can force a decision, but it can direct the formulation of the decision. Implementation of these four policies will prove quite difficult and will generate great resistance from the development community and possibly the public sector. The result, however, will be more careful informed decisions regarding open space and a continued refinement of both conservation and preservation processes to include consideration of a missing element.

Economic values, environmental values and even aesthetic values all have importance in environmental decisions. Individual perceptions have not been given equal time. The effective use of the new measures recommended here will mean the role of perceptions and values will not have to occupy a low priority position, and the influence of those perceptions on private land

development will not be set aside as a moot point or a false bargaining chip which has no true effectiveness.

Appendix A

MASTER'S RESEARCH PROJECT
DEPARTMENT OF COMMUNITY PLANNING
THE UNIVERSITY OF RHODE ISLAND
Prepared by Mary Ann Carpenter

QUESTIONNAIRE
Bridgham Farm
East Providence, Rhode Island

This survey is being done for my Master's Research Project. As such, the answers you give will be important to me in my attempt to test a method of assigning a value to parcels of open space in general. As a graduate student of Planning at The University of Rhode Island, I think it is important to devise ways of valuing amenities such as open space so that they can be defended if need be. I have no stake in the Bridgham Farm project per se. The information obtained through this questionnaire will be used and studied only by myself in writing and compiling my Master's Project. The Planning Department of the City of East Providence may be interested in the results of the survey for its general worth as a means of testing an evaluation technique, but not for analysis of the site itself. I would appreciate your thoughtful cooperation in responding, and thank you very much for your time. (Please do_not include your name.)

1. How long have you lived in your house?_____

2. What is your age? (optional question)_____

3. Do you have children? Yes_____ No_____

4. If so, what are their ages?_____

5. What is your annual income? (optional question)_____

6. Do you and your family use the open space which is part of the Old Bridgham Farm? Yes_____ No_____

7. If so, in what way do you use it? Check one or more.

   Play space for children _____
   Walking_____
   Bird and animal watching_____
   Viewing nature_____
   Other (please name)_____

8. Would you say you derive value from the site?
   Yes_____ No_____

9. How much would you be willing to pay per year for this value?
Less than $10 _____ $50_____ $100_____
$500_____ $1,000_____ more than $1000_____

10. Would you give up access to the area in return for $100, $500, $1,000 per year? (Please circle an amount.)

What amount per year would you consider fair compensation for giving up access to the area? _____

11. In your opinion, the site is most important for:
Please check one or more

Its nice view_____
A place for kids to play_____
A place where animals live_____
A place to practive golf shots_____
Other (please describe)_____

12. Which of the following do you think would be affected most by development on the site: (Please check one or more)

Health_____
Esthetic Values (views, natural beauty)_____
Recreation_____
Safety_____
Enviromental Quality_____
Transportation_____
Other (please describe)_____

13. In general, do you think people should have rights to use land they don't own? Yes_____ No_____

What should the use be? (Please choose)

Passive, non-invasive_____ (such as walking, picnics)
Crossing over only_____
Anything that doesn't cause damage_____

14. Are you in favor of:

Development continuing as it is now_____
Limited Development_____
No Development_____

15. Hou would you limit growth?

Strict zoning_____
Requiring open space in new developments_____
Purchasing open space _____
Other (please describe)_____

16. I would appreciate your comments on the value which you assign to the Bridgham Farm site which were not covered by the above questions. The value can be monetary or simply a description of the way in which the site enhances your home, the neighborhood or your life. Please include any recommendations you may have for preserving open space parcels.

COMMENTS:

Appendix B

Runoff Calculations

Scenario Number One--Undeveloped

21.26 acres Rainfall 5 inches
Curve Number 39 Runoff < 1 inch

****

Scenario Number Two--63 Single Family Residences
lot size 10000 sq. ft.
25 ft. setback

Surface	Acres	Percent
Roads	5.79	27.2
Roofs	3.18	15.0
Driveways	0.65	3.1
Lawns	10.85	51.0
Open Space	0.79	3.7
Total	21.26	100.0

Rainfall 5 inches
Curve Number 66
Runoff=1.73 inches

****

Scenario Number Three--73 Clustered Condominiums

Surface	Acres	Percent
Open Space	13.65	64.2
Buildings	2.34	11.0
Roads	5.27	24.8
Total	21.26	100.0

Rainfall 5 inches
Curve Number 60
Runoff=1.3 inches

Appendix B (continued)

Peak Discharge

Scenario Number One--Undeveloped

Interpolated at < 5 cubic feet per second

****

Scenario Number Two--63 Single Family Residences

Peak Discharge	10.00 cubic feet/second
Runoff	1.73 inches
Product	17.30 cubic feet/second
Slope Factor (1.24)	
Discharge	21.5 cubic feet/second

****

Scenario Number Three--73 Clustered Condominiums

Peak Discharge	9.00 cubic feet/second
Runoff	1.30 inches
Product	11.70 cubic feet/second
Slope Factor (1.24)	
Discharge	14.51 cubic feet/second

==========

Roadway Deposition
(Scenario Three)

146 cars	1.5 miles of roads
2 axles/car	2 trips/day
292 axles	

584 axle trips/day
876 axle miles/day
319740 axle miles/year

Constants	x 319740 =	Deposition lbs/acre/year
Grease	1.52×10^{-5}	4.86
Phosphate	1.44×10^{-6}	0.46
Nitrate	1.89×10^{-7}	0.06
Chloride	2.20×10^{-6}	0.70
Lead	2.79×10^{-5}	8.92
Copper	2.84×10^{-7}	0.09
Zinc	3.50×10^{-6}	1.12

Appendix C

NATURAL HERITAGE PRESERVATION COMMISSION NHP-102
1/26/88

PRIMARY SCORING CRITERIA INFORMATION SHEET FOR OPEN SPACE ACQUISITIONS

A. Rare and Endangered Species

The property provides habitat supporting, or capable of supporting rare or endangered species. Species to be considered under this criterion are those currently listed by the Rhode Island Natural Heritage Program.

SCORING: Points are assigned base on the following definitions. In the case of multiple occurrences, the point value for the species in the highest category is used. Maximum points = 10.

Federally Endangered. At the present time, only properties supporting populations of the Small Whorled Pogonia (Isotria medeoloides) would qualify under this category. (10 points).

Federally Threatened. At the present time, only properties providing nesting habitat for the Piping Plover (Charadrius melodus) would qualify under this category. (9 points).

State Endangered. Native species in imminent danger of extirpation from Rhode Island. Species that meet one or more of the following criteria: 1) a species currently listed or proposed by the U.S. Fish and Wildlife Service as Federally threatened or endangered; 2) a species with 1 or 2 known or estimated total occurrences in the state; 3) a species apparently rare or threatened, and estimated to occur approximately 100 or fewer occurrences range-wide. (8 points).

State Threatened. Native species which are likely to become state endangered in the future if current trends in habitat loss or other detrimental factors remain unchanged. These species meet one or more of the following criteria: 1) a species with 3 to 5 known or estimated occurrences in the state; 2) a species with more than 5 estimated occurrences in the state but especially vulnerable to habitat loss. (7 points).

Species of State Interest. Native species not considered to be state endangered or threatened, but occur in 6 to 10 known or estimated sites. (6 points).

Species of Concern. Native species which do not apply under the above categories, but are additionally listed by the Natural Heritage Program due to various factors of rarity and/or vulnerability. (5 points).

B. Critical and Uncommon Habitats.

The property is an uncommon, biologically fragile and/or critical habitat or is a unique ecological community in the state or region.

SCORING: Points assigned for the occurrence of the following habitat types. In the case of multiple occurrences, the value of the best example is used. Maximum points = 5.

Excellent Example	= 5 points
Good Example	= 4 points
Average Example	= 3 points
Mediocre Example	= 2 points
Poor Example	= 1 points

HABITAT TYPE

Coastal Plain Pond and/or Pond shore
Coastal Marshes & Associated Wet land Types
Coastal Interdunal Swales/Marshes
Level Bogs
Sloping or Basin Fens
Morainal Grasslands
Dune Systems (Coastal or Inland)
Pitch Pine/Scrub Oak Barrens
Floodplain Forests
Calcareous Habitats (forests, outcrops, etc.)
Other _____

C. Outstanding Example of Common Community Types.

The property is an outstanding representative of other ecological community types in the state. This criteria seeks to preserve high-quality examples of commoner types that support productive and diverse biological communities.

SCORING: As these are common community types, points are assigned to only high quality examples, with discretion used on average examples. Multiple occurrences receive the value of the best example. Maximum points = 5.

Excellent Example	= 5 points
Good Example	= 4 points
Average Example	= 1-3 points

D. Protection of Existing Sites.

Preservation of the property would increase the protection of existing natural areas or enhance the linking of open space areas.

SCORING: Assignment of points is based upon such factors as the size of the parcel, its connection or relationship to existing public lands (i.e., addition/buffer, linkage/corridor, inholding), potential for incorporation into a green way (i.e., location along a stream course or power line easement), and its relationship to present and projected urban structures.

Maximum points 10

E. Other Unique Natural Features.

The property possesses other natural features of significance which are included under the following major groups:

E.1 - Archeological Features
E.2 - Geological Features
E.3 - Biological Features

SCORING: Each property is assessed for the presence of other natural features. Each feature is assigned points as follows:

Excellent Example = 5 points
Good Example = 4 points
Average Example = 3 points
Mediocre Example = 2 points
Poor Example = 1 point

Additional points may be assigned in the case of multiple occurrences to the limit of 10 points in each major group. For example, if a site contains a good example each of a drumlin and an esker it could be assigned a total of 8 points. If it also included a good example of a kame, the maximum points assigned could only be 10.

Maximum points for Other Unique Natural Features = 30

E.1 Archeological and Paleontological Features.

1. Fossil Sites

2. Pre-Colonial Sites.

Indian Burial Grounds
Indian Rock Shelters
Other _____

E.2 Geological Features. Sites illustrating past land-altering or forming processes, ongoing geological processes, or other unusual geological features.

1. Glacial Effects.

Glacial Scratches on Rock Outcrops
Drumlins
Kames
Eskers
Erratics or Boulder Trains
Kettle Holes
Moraine Topography
Outwash Plains

2. Volcanic Effects

Basalt Intrusion/Pillar
Volcanic Upthrusting

3. Outcrops Revealing Geologic Processes

Igneous Formations and Intrusions
Metamorphic Effects (folding, faults, etc.)
Sedimentary Beds

4. Sites of Material Deposition/Removal

Natural Breach ways
Sand Spits/Tombolos
Barrier Beaches
Dune Formations/Desert Areas
Cobble Beaches
Cuspate Forelands

5. Springs

Freshwater Springs

6. Outstanding or Unusual Mineral Deposits

Mineral Deposits

7. Sites of Good Physical Relief

Gorges, ledges, cliffs
Natural Waterfalls
Areas of White Water

8. Other Geological Features (Hydrological)

Other Features

E. 3 Biological Features. Sites of faunal or floral significance not included in other criteria.

1. Pertaining to Fauna

Migratory Bird Concentration Area
Wintering Waterfowl Concentration Area
Nesting Colonies of Non-listed Birds
Breeding Ponds for Non-listed Amphibians
Streams Supporting Anadromous Fish Runs
Bat Roosts (Not in buildings)
Large Shellfish Beds
Unusual Invertebrate Populations

2. Pertaining to Flora

Unique Genetic Variations of Unlisted Plants
Exemplary Native Tree Specimens

3. Other Biological Features

F. Scenic Features.

The property possesses outstanding scenic or aesthetic values. While less capable of objective evaluation, a property which the Commission determines to possess particularly outstanding scenic or aesthetic qualities is to have such criteria given consideration. Rhode Island has adopted the evaluation scheme utilized by Massachusetts which involves the review of scenic qualities typical of the physiographic regions of the state. The regions adopted for Rhode Island include:

1. Coastal Plain (Block Island and the south shore of Washington County up to, and including, the Charlestown Recessional Moraine.)

2. Narragansett Lowland (Mainland areas from sea level, including Narragansett Bay, up to the 200' elevation.)

3. Western Upland (200' elevation and above.)

SCORING: Each property is evaluated using the checklist keyed to the physiographic region within which it occurs, (see descriptive sheet), with points assigned on a scale of 1-10 depending on the quality of the scenic features present. Maximum Points = 10.

G. Habitat Diversity

The property includes open or agricultural land which provides good habitat diversity supporting wildlife or the property includes five or more contiguous acres which are suitable for the production of crops or livestock by reference to soil type or existing use.

SCORING: Points assigned on a scale of 1-10. Maximum Points =10.

H. Flood Protection

For coastal flood prone areas

Preservation of property located within 1,000 feet of the shoreline of a tidal water body and which is designated on Flood Insurance Rate Maps published by the Federal Emergency Management Agency as Special Flood Hazard Areas (V zones and A zones).

Maximum points 10

or in the case of inland areas

Preservation of the property would prevent development of an area prone to flooding or other natural hazard. Maximum points 5

SCORING: Points assigned on a scale of 1-10. Maximum Points =10.

I. Urban Habitat.

The property is located in an urban or developed context where its habitat, open space, scenic, and/or educational values are thereby particularly significant, unique or vulnerable.

SCORING: Points assigned on a scale of 1-10. Maximum Points = 10.

J. Planning Consistency.

The property is specifically identified in terms of priority, timing, and cost in the local Recreation, Conservation and Open Space Plan, SCORP, Open Space Plan, or land trust Master plan.

SCORING: Points assigned on a scale of 1-10. Maximum Points = 10.

K. Water Supply Protection.

The property provides protection for watersheds or groundwater recharge areas.

SCORING: Points assigned on a scale of 1-5. Maximum Points = 5.

TOTAL POINTS FOR PRIMARY CRITERIA MAXIMUM POINTS = 115

SECONDARY SCORING CRITERIA

After the evaluation of primary criteria, the Commission will also evaluate each application for certain secondary criteria. These criteria area listed below. Although space is given for the assignment of points under each criteria, the secondary score will be a combined total for all criteria listed. It is permissible to assign negative values to secondary criteria where the property is not defensible against outside influences, or the price is too high. Point Spread = minus 10 to plus 10.

1. Property is subject to development pressure and/or likely conversion in land use. Properties in more imminent danger of loss due to urban development shall receive a higher ranking.

2. The applicant possesses the capacity to manage the property to preserve its scenic, natural, and ecological values.

3. Availability and price of the property.

4. Suitability of alternate protection techniques.

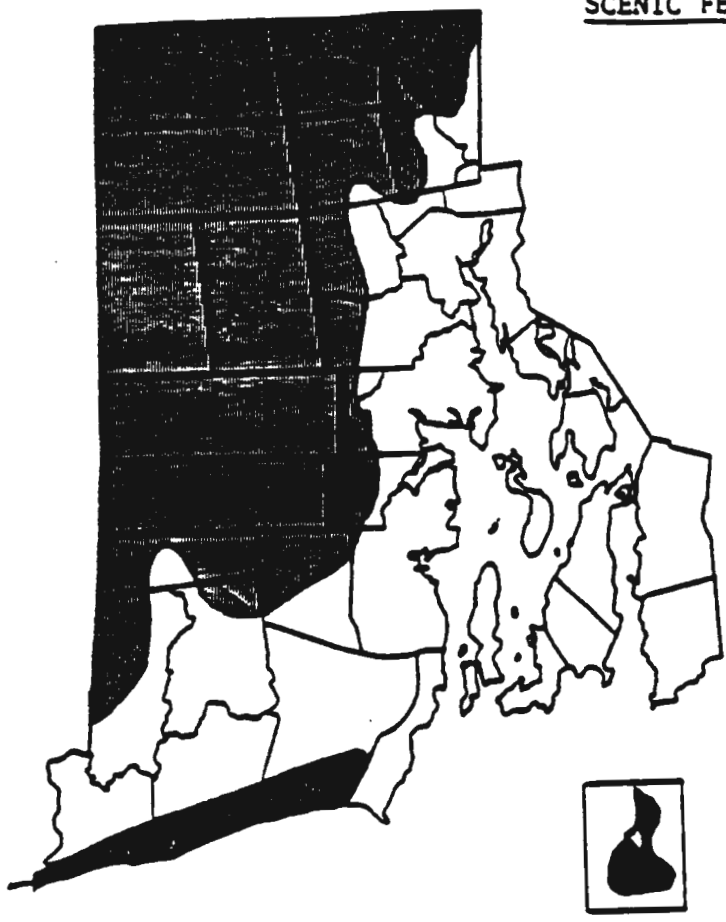
5. Defensibility against future degradation by activities occurring on neighboring properties.

6. Capacity of property to accommodate passive recreational use without endangering or degrading its natural value.

7. Intensity and expense of management activities required to preserve the property's values.

8. Ability to use the property for environmental education.

SCENIC FEATURES



Physiographic Regions

Coastal Plain

Narragansett Lowland

Western Upland

(Boundaries Approximate)

SCORING:

Points

10 Distinctive — 5 — 0 Commo

1. COASTAL PLAIN

Feature	Distinctive	Noteworthy	Common
Landform:	Noted geological features. (Mohegan Bluffs)	Undulating land. Some identifiable features.	Little topographic variety.
Landcover:	Variety of woodland and agriculture/pastoral land, or of woodland and moorland.	Variety of land use with woodlands dominating.	Unbroken woodland, scrub land.
Glacial Features:	Sea cliffs, moraine hills.	Outwash plain pitted.	Outwash plain flat.
Rivers & Streams:	Streams with no visible pollution. Some changing flow, little or no stream-front development.	Unpolluted brooks, some changing flow. Low density development.	High density contemporary riverfront development. Visible pollution.
Lakes & Ponds:	Little or no shoreline development, varied shoreline configuration, islands or outstanding shoreline vegetation.	Some shorefront development.	High density shoreline development.
Coastal Features:	Beaches undeveloped, dunes relatively undisturbed, barrier beaches.	Some shorefront development, some disturbance to dunes.	Heavy shorefront development. Dunes destroyed or absent.
Estuaries:	Large areas of marshland with woodland. Little or no contemporary development visible.	Large areas of marshland, contemporary development in viewshed but not destroying visual quality.	Marshland bordering on heavy development.
Headlands:	Sand/gravel headlands greater than 50'. Little development.	Headlands less than 50'. Some development.	Headlands minimal or absent. Heavy development.
Cultural Features:	Small fishing villages, historic buildings, pastures. Little contemporary development within viewshed. Major eyesores absent.	Some carefully designed contemporary development.	High density development, strip towns. Major eyesores that destroy visual integrity.
Vistas:	Vistas of ocean, estuary, salt-marshes, farmland. Few eyesores.	Narrow or partly obscured views. Occasional intrusions.	Vistas minimal or absent due to new development, etc. Eyesores.

NATURAL COMMUNITIES IN RHODE ISLAND

The following classification can be used as guide to evaluating items B. Critical and Uncommon Habitats and C. Outstanding Examples of Common Community Types, of the primary scoring criteria of the Natural Heritage Preservation Commission. For the purposes of this classification, a Natural Community is a distinct and reoccurring assemblage of plants and animals naturally associated with each other and with their physical environment. These communities can be characterized by a combination of there physiognomy, vegetation structure and composition, topography, substrate, and soil moisture and reaction. Non-forested communities are named by characteristic features, for example coastal dune, morainal grassland, and coastal plain pond shore. Forested communities are further broken down to identified associations named for the dominant tree species, for example White Pine or mixed Oak.

The classification does not include habitats which are primarily man-influenced, such as orchards, Red Pine plantations, corn fields, etc. Those communities considered critical or unique, as defined under section B. Critical and Uncommon Habitats, are indicated by the symbol (**).

A. Palustrine Communities
1. Coastal Plain Pond shore (**)
2. Coastal Plain Quagmire (**)
3. Inland Acidic Pond shore
4. Coastal Salt Pond Marsh (**)
5. Coastal Interdunal Marsh/Swale (**)
6. Basin Marsh
7. Coastal Interdunal Basin Swamp (**)
8. Basin Swamp
9. Level Bog (**)
10. Acidic Sloping Fen (**)
11. Acidic Level Fen (**)
12. Calcareous Fen (**)
13. Acidic Seepage Swamp
14. Calcareous Seepage Swamp (**)
15. Seepage Marsh]
16. Streamside/pondside Marsh
17. Streamside/pondside Swamp

B. Terrestrial Communities (forest canopy lacking or partly open).
1. Acidic Rocky Summit
2. Calcareous Rocky Summit (**)
3. Acidic Cliff
4. Calcareous Cliff (**)
5. Acidic Talus Slope
6. Riverside Seep/riverside outcrop/gravel bar (**)

B. Terrestrial Communities (continued)

7. Coastal Dune (**)
8. Coastal Rocky Headland
9. Coastal Beach Strand
10. Morainal Grassland (**)
11. Pitch Pine/Scrub Oak Barren (**)

C. Terrestrial Communities (forest canopy closed, or nearly so).

1. Temperate Evergreen Forests:

   a. White Pine Cover Type
   b. Pitch Pine Cover Type
   c. Hemlock Cover Type
   d. Hemlock/White Pine Cover Type

2. Temperate Evergreen Swamp Forests

   a. Southern White Cedar Cover Type

3. Boreal Evergreen Swamp Forests

   a. Black Spruce Cover Type (**)

4. Temperate Mixed Evergreen/Deciduous Forest

   a. Mixed Oak/White Pine Cover Type
   b. Mixed Oak/Pitch Pine Cover Type
   c. Mixed Oak/Hemlock Cover Type
   d. Chestnut Oak/Hemlock Cover Type

5. Temperate Deciduous Forests

   a. Chestnut Oak Cover Type
   b. Mixed Oak Cover Type (this type is further broken down based on soil moisture and species dominance)
   c. Mixed Mesic Cover Type

6. Temperate Deciduous Swamp Forests

   a. Pin Oak/Ash Cover Type
   b. Red Maple Cover Type

D. Estuarine Communities

1. Intertidal Flats and Shores (**)
2. Saline Tidal Marsh (**)
3. Brackish Tidal Marsh (**)
4. Freshwater Tidal Marsh (**)
5. Saline/Brackish Subtidal Estuary (**)
6. Fresh/Brackish Subtidal Estuary (**)

Definitions of State Status

(SE) State Endangered. Native species in imminent danger of extirpation from Rhode Island. These species meet one or more of the following criteria:

1. A species currently listed, or proposed by the U.S. Fish and Wildlife Service as Federally endangered or threatened.

2. A species with 1 or 2 known or estimated total occurrences in the state.

3. A species apparently globally rare or threatened, and estimated to occur at approximately 100 or fewer occurences range-wide.

(ST) State Threatened — Native species which are likely to become state endangered in the future if current trends in habitat loss or other detrimental factors remain unchanged. These species meet one or more of the following criteria:

1. A species with 3 to 5 known or estimated occurrences in the state.

2. A species with more than 5 known or estimated occurrences in the state, but especially vulnerable to habitat loss.

(SSI) State Interest. Native species not considered to be State Endangered or State Threatened at the present time, but occur in 6 to 10 sites in the state.

(C) Species of Concern — Native species which do not apply under the above categories but are additionally listed by the Natural Heritage Program due to various factors of rarity and/or vulnerability.

(SX) State Extirpated — Native species which have been documented as occurring in the state but for which current occurrences are unknown. When known, the last documentation of occurrence is included. If an occurrence is located for a SX species, that species would automatically be listed in the State Endangered catagory.

References

Bair, Frederick H., Jr. "The Open Space Net." Planner's Advisory Service Report No. 230. American Society of Planning Officials. January 1968.

Boulding, Kenneth. "The Economics of the Coming Spaceship Earth." Environmental Quality in a Growing Economy. H. Jarrett, ed. 1971, as referenced in Environmental Protection: Law and Policy. Frederick R. Anderson, Daniel R. Mandelker, A. Daniel Tarlock. Boston: Little Brown and Company, 1984.

Brower, David J.; Candace Carraway, Thomas Pollard and C. Luther Propst. Managing Development in Small Towns. Washington, D.C.: American Planning Association, 1984.

Buchanan, Peter. "Landscape, Architecture, Urbanism." The Architectural Review. Vol. CLXXV. No. 1048. June 1984.

Builder Magazine. "Cluster," Eighteenth Annual Land Use Report. 1978.

Canter, Larry W., Samuel Fa. Atkinson and F. Larry Leistritz. Impact of Growth. A Guide for Socio Economic Impact Assessment and Planning. Chelsea, Michigan: Lewis Publishers, Inc., 1985.

Cashan, Lisa; Lynn Paxson and Mark Francis. Community Open Spaces. Washington, D.C.: Island Press, 1984.

Cather, Willa. A Lost Lady. New York: Random House, 1972.

Clawson, Marion. "Open (Uncovered) Space as a New Urban Resource." in The Quality of the Urban Environment. Harvey S. Perloff, ed. Washington, D.C.: Resources for the Future, Inc., 1969.

Connor, Susan Marie. "Performance Zoning: Successor to Euclidean Zoning?" in A Planner's Guide Land Use Law. Stuart Meck and Edith M. Netter, eds. Planners Press, 1983.

Faludi, Andreas. A Decision-centred View of Environmental Planning. New York: Pergamon Press, 1987.

Faraci, Pierro. "Vest Pocket Parks." Planner's Advisory Service Report No. 229. American Society of Planning Officials. December, 1967.

Fuller, R. Buckminster. Operating Manual for Spaceship Earth. New York: E.P. Dutton, 1978.

Heyman, Michael. "Innovative Land Regulation and Comprehensive Planning." in The New Zoning: Legal

Administrative and Economic Concerns and Techniques. Norman Marcus and Marilyn W. Groves, eds. Praeger, 1970.

Hite, J.C. and E.A. Laurent. Environmental Planning: An Economic Analysis. New York: Praeger, 1972.

Hufschmidt, Maynard M.; David E. James, Anton D. Meister, Blair T. Bowen and John A. Dixon. Environment, Natural Systems and Development. Baltimore: Johns Hopkins University Press, 1983.

Jones, Hubie. Dean, School of Social Work, Boston University. "Remarks, The Greening of Boston." Boston College Citizen Seminar. November 30, 1987.

Kendig, Lane; Susan Connor, Cranston Byrd and Judy Heyman. Performance Zoning. Planner's Press, 1980.

Knetsch, J.L.and R.K. Davis. "Comparison of Methods for Recreation Evaluation." in Water Research. A.V. Kneese and S.C. Smith, eds. Baltimore: Johns Hopkins University Press. 1966.

Lord, Peter. "The Race for What's Left." Providence Sunday Journal Magazine, October 25, 1987.

Lynch, Kevin and Gary Hack. Site Planning. Cambridge: MIT Press, 1986.

Master Plan for Parks, Recreation and Open Space. East Providence, Rhode Island. Master Plan Reports, Publication Number Six, 1962, as amended, 1975, 1985.

McElroy, Joseph J. "You Don't Have to be Big to Like Performance Zoning." in Perspectives on Small City Planning and Policy Making. Ginn Press, 1986.

Opaluch, James J. "Valuing Natural Resource and Environmental Amenities: Can Economic Valuation Techniques Be Made Defensible?" Northeast Journal of Agriculture and Resource Economics. 13(2) October, 1984.

Primack, Mark, ed.; Robert M. Hollister, Christine Cousineau and Lee Warren. The Greening of Boston, An Action Agenda. A Report from the Boston Foundation, Carol R. Goldberg Seminar. Center for Public Service, Tufts University, 1987.

O'Mara, Connie Weis. "The Problem of Urban Runoff." Environmental Comment. December, 1978.

Rhode Island Department of Statewide Planning, Technical Paper No. 129. "Housing and Residential Land Demand: Rhode Island 2010." 1987

Rhode Island Historical Preservation Commission. "East Providence, Rhode Island Statewide Preservation Report P-EP-1." September 1976.

Rizzo Associates, Inc. "Traffic Impact Study, Bridgham Farm, East Providence, Rhode Island." November, 1987.

Sanders, Welford. The Cluster Subdivision: A Cost Effective Approach. Planner's Advisory Report No. 356, Chicago: American Planning Association, 1980.

Turvey. "What is the Case for Planning?" Journal of the Town Planning Institute. Vol. 41, pp. 269-270, 1955.

Tye, Larry. "The High Cost of Prosperity." Boston Sunday Globe, April 10, 1988.

Untermann, Richard and Robert Small. Site Planning for Cluster Housing. New York: Van Nostrand Reinhold Company, 1977.

U.S. Department of Agriculture, Soil Conservation Service. Rhode Island Soils Manual.

Wald, Matthew L. "Rhode Island Program Pays Farm Owners to Limit Development on Land." New York Times, November 3, 1985.

Wright, Robert R. and Morton Gitelman. Cases and Materials on Land Use Law. 3rd ed. West, 1982.