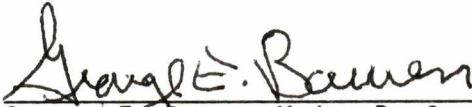
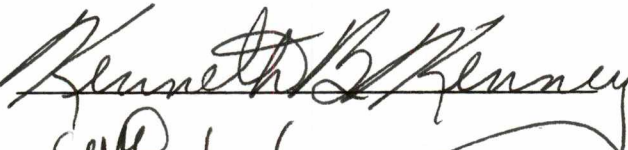
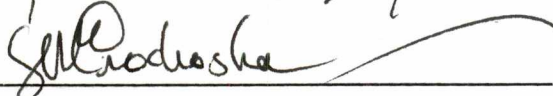


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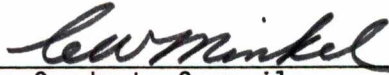
I am submitting herewith a thesis written by Ricky L. Morris entitled "A Case Study of the Cost Factors Associated with the Development of Gardner Matthews Plantation, Hilton Head Island, South Carolina: An Environmentally Fragile Area." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science in Planning.


George E. Bowen, Major Professor

We have read this thesis
and recommend its acceptance:

Accepted for the Council:


The Graduate Council:

A CASE STUDY OF THE COST FACTORS ASSOCIATED WITH THE
DEVELOPMENT OF GARDNER MATTHEWS PLANTATION,
HILTON HEAD ISLAND, SOUTH CAROLINA:
AN ENVIRONMENTALLY FRAGILE AREA

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Ricky L. Morris
August 1984

DEDICATION

Dedicated to my mother, Betty White; and my wife, Brenda,
with love

ACKNOWLEDGEMENTS

It is with great respect that I thank Professor George E. Bowen, my major advisor, for his patience, guidance, and encouragement during the writing of this thesis. Without his expertise, this thesis could not have been accomplished. Whatever errors remain in my work, however, are solely my responsibility.

I hereby acknowledge with thanks the permission granted by the Conservation Foundation to reprint page 64 from Three Approaches to Environmental Resource Analysis, by Raymond K. Belknap and John G. Furtado (1967). I would also like to acknowledge with thanks the permission granted by the Urban Institute Press to reprint Exhibit 1 from Measuring Impacts of Land Development, by Philip S. Schaenman and Thomas Muller, and Table I-3 from Economic Impacts of Land Development: Employment, Housing, and Property Values, by Thomas Muller (1976).

Finally, it is with great appreciation that I hereby acknowledge with thanks Bruce Black and the numerous public and private professionals who provided me with the data necessary to complete this thesis.

ABSTRACT

During the past three decades, South Carolina's Barrier Islands have come under considerable development pressure. Increasing urbanization has created local and state concern about the rate, quantity, and quality of island development and about the accompanying side effects of development on a barrier island's environment. Another issue of concern is whether or not such development is beneficial from a public perspective. It was the intent of this thesis to examine both fiscal and environmental issues for one of the more dynamic and renowned barrier islands of South Carolina--Hilton Head.

The thesis first examined environmental planning process theory, development standards theory, and economic/fiscal impact theory. Theory was then compared to practice by conducting a case study of Gardner Matthews, a future Island plantation. Finally, a costs factors assessment for Gardner Matthews was conducted.

Two methods were used to examine Gardner Matthews Plantation. First, a literature review was conducted on the previously mentioned theories. The second method involved the examination of Hilton Head Company documents, public reports, and interviews with public officials and Hilton Head Company employees. Private costs/revenues were derived from Hilton Head Company estimates. Public costs/revenues were determined by using a per capita multiplier method, multiplier method, and data duplication method.

The study found public revenues as well as private revenues, generated as a result of Gardner Matthews Plantation, to be greater than public or private costs. Economically, all impacts were found to be positive. From an environmental standpoint, the Hilton Head Company needs to incorporate goals and objectives and an environmental analysis method into their development/planning process.

PREFACE

The original intent of this thesis was to study the cost factors associated with environmentally sensitive development standards. The study was to focus on the Gardner Matthews Plantation on Hilton Head Island. During the course of the study, however, it was learned that the development planning process was market based and not environmentally based even though Hilton Head Island is an environmentally sensitive area. In addition, after the study was underway, the Town of Hilton Head adopted development standards which did not apply to the Gardner Matthews Plantation since its development plans had been previously approved and therefore was exempt from the new standards.

Although the Gardner Matthews Plantation may be an environmentally sensitive development, it was not based on the environmentally sensitive development standards adopted by the Town of Hilton Head. The developers of the Gardner Matthews Plantation contend that the development plan meets or exceeds the adopted development standards even though it was approved before the standards were adopted.

The developers also pointed out that in responding to the market for exclusive resort development they have to develop in an environmentally sensitive way. However, in reviewing the plans and studies which were produced for the Gardner Matthews Plantation, it appears that only a tree survey and wetlands study was conducted. The developers also pointed out that the plans were developed by a

professional team consisting of registered architects, engineers, and landscape architects and that these plans are based on professional standards which produce an environmentally sensitive development.

Since the City development standards did not apply to the development of Gardner Matthews and the typical development quality produced by the Hilton Head Company are said to exceed the adopted development standards, it was impossible to attribute increased cost to the City's development standards. Therefore, the thesis addressed total cost factors rather than increased costs associated with environmental development standards.

Finally, interviews with officials associated with the planning of Gardner Matthews highlighted an issue which was not anticipated. This issue is that price is not directly derived from costs. Price is determined by what the market is willing to pay. The buyer for Hilton Head property is wealthy, interested in prestige and the unique environment, and the resort atmosphere. The developer is required to produce the unique environment and resort atmosphere and cost is not as significant a factor in the development decision making process as in conventional developments.

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CHAPTER I

INTRODUCTION

Hilton Head Island is located in Beaufort County, South Carolina. The Island, which is approximately 42 square miles in size, is one of the largest barrier islands on the Eastern Seaboard.¹ The completion of the James F. Byrnes Bridge in 1956 opened the Island for development. Since 1956, Hilton Head Island has become a nationally and internationally recognized residential/resort community. Consequently, given its international and national prominence, Hilton Head Island plays a vital role in South Carolina's resort/tourism industry.

Approximately 700,000 tourists visit Hilton Head Island each year.² From 1972 through 1981 the Island attracted 4,000,000 visitors, with tourist expenditures during that time frame totaling to \$831,600,000.^{3,4} The Island supports a seasonal and permanent peak

¹Virginia Black, Mike Easterwood, T. I. Maupin, and Charlie Tyer, "Incorporation as an Option for Hilton Head Island, SC: A Preliminary Analysis," (University of South Carolina, Bureau of Governmental Research and Service, 1982), p. 1.

²Richard A. Dey, Hilton Head Island Chamber of Commerce Newsletter (Hilton Head Island, South Carolina, October 1982), p. 5.

³Richard A. Dey, Hilton Head Island Chamber of Commerce (South Carolina), "Growth in Number of Resort Guests/Visitors 1972-1981." (Typed publication.)

⁴Richard A. Dey, Hilton Head Island Chamber of Commerce (South Carolina), "Growth in Annual Expenditures by Resort Guests/Visitors 1972-1981." (Typed publication.)

population of 40,000 persons.⁵ The Beaufort County Joint Planning Commission estimates that the peak seasonal population for Hilton Head Island will reach approximately 64,000 by the year 2000, and that the Island will continue to experience significant growth in its permanent population.⁶

From 1970 to 1980, Hilton Head's permanent population grew from 2,546 persons to 11,344 persons, an increase of 224 percent from the 1970 population level.⁷ The Beaufort County Joint Planning Commission estimates that the Island's permanent population could reach approximately 26,000 persons by the year 2000.⁸

The majority of persons living on Hilton Head reside in large planned unit developments, commonly known as "plantations." Plantations on Hilton Head Island consist of single and multi-family residential units, commercial, recreational and light industrial uses. Plantation developments are governed by master plans which were once approved by the Beaufort County Joint Planning Commission but now are approved by the newly incorporated Town of Hilton Head.

Fifty percent of the Island development to date consists of residential, office, commercial, recreational and light industrial

⁵Virginia Black, Mike Easterwood, T. I. Maupin, and Charlie Tyer, "Incorporation as an Option for Hilton Head Island, SC: A Preliminary Analysis" (University of South Carolina, Bureau of Governmental Research and Service, 1982), p. 3.

⁶Ibid.

⁷Ibid.

⁸Ibid.

land uses, while the remaining 50 percent of the Island consists of planned unit developments.⁹ Approximately 10,000 acres, or 35 percent of the Island's 27,954 acres, are currently developed.¹⁰ This leaves approximately 18,000 acres of undeveloped area remaining on Hilton Head Island.¹¹

Problem Statement

Increasing urbanization on Hilton Head Island has created a number of problems for the Island and its residents. Of specific concern to Island residents is the rate, quantity and quality of Island development and the accompanying side effects of accrued development. Major environmental issues on the Island are: water quality, water quantity, sewage disposal, and flooding.

The primary problem with water quality is non-point source pollution. Non-point source pollution is associated with stormwater runoff which cannot filter into the ground due to the large amount of land surface being developed with parking lots, roads, driveways, buildings and other impermeable surfaces. In an urbanized area, stormwater runoff acquires a variety of chemicals (e.g., oil, gas, etc.), bacteria, and other contaminants which are carried by stormwater runoff to the Island's streams, canals, rivers and estuaries. Consequently, the stormwater runoff contaminates the Island's marine

⁹Ibid., p. 1.

¹⁰Ibid., p. 2.

¹¹Ibid.

resources (i.e., oysters, clams, shrimp) and prevents certain Island water areas from being harvested. Also, continual development tends to increase the problem of non-point source pollution and stormwater runoff.

Problems associated with water quantity can be attributed to increasing residential, commercial, office, and light industrial development on Hilton Head Island. Increasing industrial water use in Savannah, Georgia has also led to the gradual depletion of the principle Artesian Aquifer, Hilton Head's main potable water source.

Hilton Head Island has four public service districts and one private utility company. The four public service districts (PSDs) are: Sea Pines, Forest Beach, Hilton Head, and Broad Creek. Hilton Head Plantation Utility Corporation is the one private utility company. Island residents are concerned with the disposal of sewage given that all of the aforementioned entities are operating near capacity.¹²

Flooding is also a problem on Hilton Head Island. The flooding on Hilton Head can be attributed to two factors: (1) low land elevation, and (2) increasing stormwater runoff caused by dense development and impermeable surfaces.

Other problems on Hilton Head Island associated with increasing development or increasing urbanization are traffic congestion, especially around commercial developments at peak periods and the

¹²Ibid., p. 9.

emergency evacuation of the Island's resort guests and residents in the case of a severe storm or hurricane.

A major question which has recently surfaced now that Hilton Head is an incorporated place is: Are the developments, which have been approved and are being planned, beneficial from the public perspective? Already some environmental problems have been encountered; however, now the public sector may be asked to play an increased role in the provision of services which have been previously left to the developers and to solve problems which have been caused by existing private developments. In addition to the fiscal impacts of proposed developments, the question of regulating the quality, quantity, and timing of new developments has also surfaced. Currently, the new government has prepared standards for new developments. A major issue which arises from the incorporation of development standards is: How will these development standards affect private and public costs? A related issue is: Will this approach serve as a growth guidance mechanism for future development of the Island? The first issue is not answered by this thesis; the second issue is addressed in the conclusions.

Hilton Head's development standards are designed to mitigate some of the adverse externalities of development and consequently protect the natural resources of the Island. The following is a sampling of those elements for which development standards are used:

1. lot design
2. service requirements (i.e., power, sewage, water, solid waste)

3. drainage
4. impervious surfaces
5. stormwater runoff
6. erosion and sedimentation control
7. special nuisances (i.e., gasoline, liquid petroleum, chlorine, pesticides, light or point source illumination, noise levels, air contaminants)
8. density and open space
9. set backs/buffers
10. non-buffer open space
11. fire safety standards
12. building height restrictions
13. protection of natural resources (i.e., clear cutting prohibited, tree survey required, tree replacement)
14. open air merchandising areas.

The development standards Hilton Head has adopted are a combination of specification standards and performance standards.

A specification standard indicates "What one can or cannot do based on the existence of a feature or a combination of features."¹³ For example, given the importance of a floodplain as an environmental feature, it must be protected from urban development.¹⁴ A

¹³Charles Thurow, William Toner, and Duncan Erley, Performance Controls for Sensitive Lands: A Practical Guide for Local Administrators (American Society of Planning Officials, 1975), Report Nos. 307-308, p. 95.

¹⁴Ibid.

specification standard emphasizes the solution characteristics to any development concern or environmental/socioeconomic feature.¹⁵ A specification standard can be defined as a guide that specifically indicates development requirements (e.g., dimensions, and materials to be used on construction). For example, a table may be specified by height, width, breadth, and thickness. The specification may also include materials (wood, metal, etc.) and even the minimum offset for the legs from any side.

Conversely, performance standards are concerned with "The specification of desired results, with the means for achieving them left open."¹⁶ Thus, under a performance standard, floodplain development could be allowed if the development was designed and organized to decrease the chance of property damage below a certain percentage, given that any floodplain development would have to be designed in a manner that would not restrict the flow of flood waters.¹⁷ As stated by Chapin, "The degree to which hazards and nuisances are brought under control becomes the test, rather than whether the land use activity itself is on a list of suitable uses in that particular location."¹⁸ Using the table example, a performance standard might deal with

¹⁵F. Stuart Chapin, Jr. and Edward J. Kaiser, Urban Land Use Planning (Chicago: University of Illinois Press, 1979), p. 371.

¹⁶Ibid.

¹⁷Ibid.

¹⁸Ibid.

minimum load bearing capacity, size to seat "x" number of people or even a stability measure to ensure it does not wobble.

The result of the Town of Hilton Head's development standards should be environmentally sensitive urban development. During the course of the study it was learned that the Gardner Matthews Plantation development would not have to meet the new development standards adopted by the City because of a Grandfather Provision. This was unfortunate in that a major issue associated with environmentally based development standards is: Do they increase the cost of development? This study does not answer this question, however, it does address total development cost and fiscal impacts.

Purpose of the Study

The purpose of this thesis is three fold: First, to investigate the nature of existing "theory" regarding the environmental planning process, development standards, and economic/fiscal impacts; second, theory will be compared to practice by conducting a case study of Gardner Matthews, a future island plantation; third, a costs factors assessment for Gardner Matthews Plantation will be conducted.

Research Questions

1. What was the environmental planning process used in the design of Gardner Matthews Plantation?
2. What role will development standards play in the development of Gardner Matthews Plantation?

3. What are the cost factors in the development of Gardner Matthews Plantation, and what are the implications for the city, developer, and residents?

4. What can be learned from Gardner Matthews Plantation that can be applied to similar developments?

Research Methodology

The research uses two methods of investigation. First, a literature review of the theory of economic/fiscal impact and cost/revenue assessment, the environmental planning process, and development standards was conducted. Second, data regarding the costs and revenues for Gardner Matthews Plantation was collected via published Hilton Head Company documents and interviews with company employees. Data regarding Hilton Head Island government was collected via public documents and interviews with City and Beaufort County officials. Cost/revenue information that was not available for Gardner Matthews Plantation was obtained by using data from other established Hilton Head Company plantations.

Cost/revenue data was analyzed by using a combination of methods. The private costs/revenues of Gardner Matthews Plantation were derived from preliminary estimates that were provided by the Hilton Head Company. The public cost/revenue analysis was derived from material published by the Urban Land Institute and Rutgers Center for Urban Policy Research. In general, three methods were used to determine public costs: (1) Per capita multiplier, (2) Multiplier, and (3) Data duplication. Public revenues were determined

by the use of a proportional evaluation technique and a multiplier technique. By using a combination of cost/revenue methods, it was possible to develop a cost factor assessment method that took into consideration the unique characteristics of Hilton Head Island.

Organization of Thesis

Chapter II contains an environmental, physical, governmental, social, and economic description of Gardner Matthews Plantation/Hilton Head Island. This chapter provides the necessary background information needed to familiarize the reader with the plantation and the Island.

Chapter III includes a discussion of the environmental planning process as it has been developed in the planning literature, and a description of the Gardner Matthews Plantation Planning Process. Particular attention is paid to the environmental component of the Gardner Matthews Plantation Process, and how it compares with the theoretical underpinnings of the environmental planning process literature.

Chapter IV is a review of fiscal, economic, and impact assessment theory. Included within the chapter is a discussion on the history of impact assessment, use, importance, issues, and an overview of impact assessment methods.

Chapter V is a case study of Gardner Matthews Plantation. First, a costs factors assessment method for Hilton Head Island is constructed. Next, private and public costs/revenues, based on the development of Gardner Matthews, are determined. The chapter

concludes by examining the effects of the proposed development on employment and housing.

Chapter VI presents a summary and conclusions from the study.

CHAPTER II

GARDNER MATTHEWS PLANTATION/HILTON HEAD ISLAND:

AN OVERVIEW

Environmental

Gardner Matthews Plantation consists of approximately 2,000 acres of forested wetland. The Plantation, as does the Island, supports a variety of sub-tropical vegetation. Included are several different types of trees and wildflowers, such as the palmetto, magnolia, live oak, azalea, camellia, and wisteria. The Plantation also harbors both poisonous and non-poisonous snakes, as well as alligators. Also roaming the Plantation are deer, wild boar, and a healthy population of birds and waterfowl. In essence, the Plantation can be described as a wilderness waiting to be developed.

Physical

Gardner Matthews is located in the center of Hilton Head Island. The Plantation is encompassed by Marshland Road to the south, Muddy Creek Road to the west, Spanish Wells Road to the north, and U. S. 278 to the north/northeast. The land located north/northeast of U. S. 278 (Northridge) is part of the Plantation. Also, there are several tracts of land located south of Marshland Road, along Broad Creek, and one large tract located north of Spanish Wells Road, that are part of the Plantation (see Plate 1).

The Plantation will be a mix of residential, commercial and recreation space. To be located within Gardner Matthews is approximately 401 acres of single family residential space, 440 acres of multi-family space, and 177 acres of commercial space. An estimated 129 acres of the total commercial acreage is for retail commercial, while approximately 48 acres is designated for office commercial.¹

There are also 14 acres of light industrial space located within the Plantation. Approximately 359 plantation acres have been devoted to recreational amenities (i.e., golf courses, clubhouse, racquet club, etc.).² Table 1 includes a listing of the remaining plantation land uses and the amount of acreage designated to each land use.

Gardner Matthews will, for all intents and purposes, be a self-sufficient plantation. It will not only be a place to live, but also a place to work, shop, and recreate. Gardner Matthews will also serve as the Island's town center. The Plantation was selected to become the Island's town center for several reasons. One reason is that the Plantation is located approximately in the geographic center of the Island. Other reasons are the Plantation's size, 10,400 linear feet of highway frontage property, and its owner.

The Plantation's size gives it a great deal of development versatility in that it can handle several different types of land

¹The Hilton Head Company, "Gardner Matthews Plantation Master Plan," Hilton Head Island, South Carolina, March 9, 1984.

²Ibid.

Table 1. Land Use and Acreage Data for Gardner Matthews Plantation.

Land Use	Acreage
Town Center	34.3
Church Sites	33.4
School Sites and Indoor/Outdoor Recreation	54.2
Open Space, Parks, Buffers	18.8
Waste Treatment and Utility Sites	16.0
Lagoons and Wetland Preserve	303.10
Road Right-of-Way	185.00

Source: Gardner Matthews Plantation Master Plan, 1984.

uses. The Plantation's highway frontage, 6,400 linear feet on the southern edge of U. S. 278, makes it ideally suited for commercial and governmental land uses. Furthermore, since the Plantation is owned by one company, it will make it easier for the city to negotiate future land acquisitions. The Hilton Head Company donated, to the town, the land necessary for the government service complex. Consequently, for these reasons Gardner Matthews Plantation will probably become the town center and focal point of Hilton Head Island.

Governmental

Hilton Head Island was incorporated as a limited service government in June of 1983. The major concerns of the new town are land use planning and building code enforcement. The Town of Hilton

Head does, however, provide police service and a litter patrol service. All other services are provided by the Island's Public Service Districts and private utility companies.

Gardner Matthews Plantation will receive service from Hilton Head #1 Public Service District (water/sewer), Hilton Head Island Fire Department, and Palmetto Electric Cooperative, a private utility company.

The first Public Service District appeared on the Island in June of 1960. The Forest Beach Commission was created as a result of increasing development in that portion of the Island. Local developers felt that public service facilities were needed to support the area's existing and new growth. In 1961, the Forest Beach Commission was replaced by the Forest Beach Public Service District. As development continued and higher intensity uses were built, it was realized by developers and residents that a need for sewage treatment facilities existed. In order to satisfy that need, the Sea Pines Public Service District was created in 1964.³

Several years later, as development on the Island expanded westward towards the mainland, Broad Creek Public Service District and Hilton Head #1 Public Service District were established to serve the central part of Hilton Head Island. Also, several private utility companies were formed to meet the various service needs of the Island's residents. As more districts were created and private

³County Council of Beaufort County, South Carolina, "Summary of Hilton Head Island Four-Zone Sanitary Sewage Treatment Plan," 1983, p. 1.

utility companies established, the Hilton Head Public Service Council was created to facilitate and assure a cooperative effort among the Public Service Districts and private utility companies, so that Island residents would continue to receive efficient service.⁴ Overall, all of the Island's public and private service institutions have done an adequate job of providing water, sewer, fire and electric service to the Island's residents. The Island incorporating as a limited service government is testimony as to the ability of the Public Service Districts and private utility companies to provide the Island's residents with efficient service.

Social

Gardner Matthews Plantation is designed in the same motif as other Hilton Head Company plantations. Consequently, the Plantation will be targeted towards a market that has the same social characteristics of those individuals and families that now reside in existing Hilton Head Company plantations.

A buyer survey conducted by Lighthouse Realty, Inc. for the Hilton Head Company provides demographic information from which a social profile can be determined.

Based on Lighthouse Realty's survey of 554 sales, it was determined that the average age of those purchasing a house, a multi-family unit, a lot, or both is 43.9 years. Of those studied, 12.9 percent bought their permanent home, 23.4 percent bought a second

⁴Ibid.

home, and 63.7 percent bought for investment purposes. The average purchase price was \$120,514. What is significant, however, is that 22.7 percent of those making a purchase paid in cash.⁵ Obviously, those surveyed are not blue collar workers. Table 2 gives a breakdown of those surveyed by occupation/title, number, and percent of total.

As Table 2 shows, those who purchased properties within Hilton Head Company plantations are generally "white collar" professionals, who seem to have a great deal of disposable income. Furthermore, it can be assumed that those who purchase properties within Gardner Matthews Plantation will be of the same social status as people living in other plantations.

However, the Hilton Head Company would like to make Gardner Matthews Plantation a place in which young professionals could afford to live. As it stands today, a young professional's salary is not generally commensurate with the cost of Island housing. Consequently, in order to accommodate such professionals, the Hilton Head Company may lower the lot costs in certain areas of the Plantation and place model homes on those lots at a reduced unit cost. The consequences of such a program would be a slight change in the social status of residents in the Plantation, and the creation of a new housing market for the Hilton Head Company and Hilton Head Island.

⁵Lighthouse Realty, Inc., "Demographic Study 1981 and 1982 (6 months)," Hilton Head Island, South Carolina (Prepared for the Hilton Head Company).

Table 2. Occupation/Title of Purchasers by Number and Percent of Total.

Occupation/Title	Number	Percent of Total
Doctors and Dentists	77	14.1%
Business Executives*	59	10.8%
Contractors/Developers	53	9.7%
Business Owners	50	9.1%
Financial--banking, stocks and bonds, insurance, accountants	47	8.6%
Attorneys	34	6.2%
Sales and Advertising	33	6.0%
Retired	30	5.5%
Real Estate	27	4.9%
Management*	18	3.3%
Vice Presidents*	16	2.9%
Presidents*	14	2.6%
Architects and Engineers	8	1.4%
All Others	<u>82</u>	<u>14.9%</u>
TOTAL	548	100.0%

*These categories cannot be considered as purchaser occupations. However, these categories remain in the table since they do provide an indication of the social status of the purchaser as described in the survey by Lighthouse Realty.

Source: Lighthouse Realty 1981, 1982.

Economic

In 1982, Hilton Head Island employed 12,144 persons.⁶ The employment market is dominated by the financial, insurance, real estate, construction, services, resort/restaurant, and retail/wholesale sectors. In 1982, those sectors combined accounted for 87 percent (10,602 persons) of all business employment on the Island.⁷

Over the past four years, the finance, insurance, real estate sector showed the greatest gain of 1,099 persons for a 329% increase.⁸ The service sector gained 1,165 employees over the past four years for a 149 percent gain.⁹ In all, 4,604 jobs were added to the Island over a four year period for a net gain of 61 percent.¹⁰

In 1982, the retail/wholesale category showed the greatest gain in the number of business started over the past four years with 237, for a 209 percent increase.¹¹ Financial, insurance, and real estate businesses increased by 101 over the same time period, for a 153 percent gain.¹² Between 1980 and 1982, 214 businesses were

⁶Gardo, Doughtie, and Rose, "Hilton Head Island Business and Employment Survey--1982" (Prepared for Hilton Head Island Chamber of Commerce, South Carolina), 1983, p. 7.

⁷Ibid., p. 12 A-R.

⁸Ibid., p. 7.

⁹Ibid.

¹⁰Ibid.

¹¹Ibid., p. 6.

¹²Ibid., p. 7.

started. Only 17 of those 214 businesses started between 1980 and 1982 were no longer operating for a 92 percent success rate.¹³

In 1982 the labor force for Beaufort County was 29,080 persons. The overall unemployment rate for Beaufort County was 6.7 percent, one of the lowest unemployment rates in South Carolina.¹⁴ In 1982, Hilton Head Island employed approximately 42 percent of the County labor force. Thus, any increase or decrease in the employment base will have a profound impact on the Island and Beaufort County.

Hilton Head's employment market and economy is greatly affected by the resort/tourist industry. The number of resort visitors to Hilton Head Island increased from 72,223 visitors in 1972 to 700,000 visitors in 1981.¹⁵ An increase of 627,777 tourists indicates that the Island, over a nine-year period, experienced an average annual increase of 30 percent in resort attendance. Table 3 lists the number of annual resort visitors from 1972 to 1981.

Resort expenditures, as well as resort attendance, have also increased over the past several years. Annual resort expenditures on the Island have increased from \$10,591,022 in 1972 to \$165,000,000 in 1981. From 1980 to 1981, resort/tourist expenditures increased

¹³Ibid.

¹⁴South Carolina Employment Security (Interview), 1983.

¹⁵Richard A. Dey, Hilton Head Island Chamber of Commerce, South Carolina, "Growth in Number of Resort Guests/Visitors, 1972-1981." (Typed publication.)

Table 3. Growth in Number of Annual Resort Guests/Visitors Percent Increase 1972-1981.

Year	Hilton Head Island	Percent Increase
1972	72,223	
1973	112,068	55
1974	194,361	73
1975	265,893	37
1976	391,725	47
1977	428,718	9
1978	550,000	28
1979	600,000	9
1980	648,000	8
1981	700,000	8

Source: Hilton Head Island Chamber of Commerce, 1982.

by 14 percent.¹⁶ Table 4 lists the growth in annual expenditures by resort guests/visitors.

Resort guests along with Island workers and residents spent an estimated \$204,399,923 for retail goods and services in 1981. This is a daily average of \$559,999. In comparison, Beaufort County residents, workers, and visitors spent \$376,184,264 on retail goods and services.¹⁷ Thus, Hilton Head Island generated 54 percent of the total gross sales of goods and services in Beaufort County. Such expenditures are feasible when you consider that the 1980 median household income on Hilton Head was \$23,854 and that the per capita income on Hilton Head in 1980 was \$13,149.¹⁸

The resort/tourism industry has a profound effect on the Island's economy. The Island tourism industry not only creates jobs for the Island and county, and regional residents, but also aids local and county governments in providing and maintaining public services.

Gardner Matthews Plantation can be described as a physical/social/economic resource for Hilton Head Island. Also, the Plantation in its natural environmental state is one of the largest remaining developable wilderness areas on the Island. Consequently,

¹⁶Richard A. Dey, Hilton Head Chamber of Commerce, South Carolina, "Growth in Number of Annual Expenditures by Resort Guests/Visitors 1972-1981." (Typed publication.)

¹⁷South Carolina Tax Commission, 1981.

¹⁸The South Carolina Division of Recreation and Statistical Services, The South Carolina Statistical Abstract 1982, p. 179.

Table 4. Growth in Annual Expenditures by Resort Guests/Visitors
Percent Increase 1972-1981.

Year	Hilton Head Island	Percent Increase
1972	\$ 10,591,022	
1973	21,928,816	107.0
1974	35,243,058	60.7
1975	48,977,958	38.9
1976	76,530,144	56.2
1977	93,338,629	21.9
1978	110,300,000	18.0
1979	125,000,000	13.3
1980	144,700,000	15.7
1981	165,000,000	14.0

Source: Hilton Head Island Chamber of Commerce, 1982.

in order to preserve many of the Plantation's natural environmental features, the planning/development process should be attuned to the environmental sensitivity of the Island.

Environmentally sensitive development planning and its place in the planning process is discussed in the next chapter, along with the Gardner Matthews Plantation planning process.

CHAPTER III

THE ENVIRONMENTAL PLANNING PROCESS AND DEVELOPMENT STANDARDS: THEORY AND PRACTICE

Environmental Planning: A Definition

Environmental planning may be defined as a systematic process that considers the natural environmental features of a study area.¹ Environmental planning facilitates the involvement of many disciplines in the planning/decision making process. Under the "environmental planning umbrella," disciplines such as urban planning, architecture, business (development/real estate), natural sciences, physical sciences and the social sciences interact. The outputs of such interdisciplinary interaction come in the form of environmental inventories/studies, impact assessments and the identification of feasible project or program alternatives. The desired end result of such interdisciplinary interaction is the maximization of benefits derived from environmentally sensitive development.

Environmental Planning Process

The comprehensive planning process addresses both the need for new development and the effects of satisfying that need in a spatial area. An environmental planning process addresses the need for new

¹Martin N. Fabrick and Joseph J. O'Rourke, Environmental Planning for Design and Construction (New York: John Wiley and Sons, 1982), p. 1.

development and specifically looks at the effects of satisfying that need on the natural environmental processes and features.²

Environmental planning was popularized by Ian McHarg. It was McHarg's work in natural process analysis that laid the foundation for environmental planning. McHarg's environmental philosophy is that:

any place is the sum of historical, physical, and biological processes; these processes are dynamic; they constitute social values; each area has an intrinsic suitability for certain uses; and certain areas lend themselves to multiple coexisting land uses.³

McHarg views the natural environment as the end result of a causative, cumulative and interrelated natural and man-made processes.

McHarg also states that:

Planning for natural processes must begin with the identification of discrete sub-processes; then determine the value of these sub-processes to man, and finally establish principles of development based upon preserving and enhancing the tolerance and intolerance of the natural process to various aspects of urbanization.⁴

McHarg believes that sub-processes of the natural environment need to be systematically analyzed within the traditional planning process.

²Ibid., p. 5.

³Treasure H. Rogers, Jr., "A Review of Approaches to Incorporating Environmental Considerations in Planning in Tennessee" (Master's Thesis, The University of Tennessee, Knoxville, 1979), p. 30.

⁴Ibid., p. 15.

The environmental planning process is not a separate nor unique planning process. Environmental planning is incorporated into the traditional planning process by integrating environmental concerns into the various planning process stages. For example, environmental planning can be incorporated into the traditional planning process by integrating environmental concerns into the goal and objective stages of the planning process. Also, the coordination of land use planning and environmental planning scenarios is a means by which environmental concerns can be introduced into the planning process. Another possible way in which to incorporate environmental concerns into the traditional planning process is to make an environmental data file an integral component of the land use information base system.⁵

An important component of the environmental planning process is the environmental planning method/procedure that is used to collect, analyze, and interpret information. Several individuals (i.e., McHarg, Lewis, Marsh, Wickersham, etc.) have devised environmental planning procedures/methods. Although differences among the methods do exist, all of the methods are derived from one of the following environmental concepts: land capability, land suitability, or carrying capacity.

⁵F. Stuart Chapin, Jr. and Edward J. Kaiser, Urban Land Use Planning (Urbana: University of Illinois Press, 1979), pp. 630-631.

Land Capability

Land capability is defined as:

the extent to which the environment of a natural system can be modified without the necessity for extensive artificial measures to redevelop or maintain a natural balance within the system (or in its place among other systems), once the new environment is established.⁶

A land capability study analyzes the natural environmental features of a study area to determine the extent to which natural environmental features can accommodate various types of development or land uses without embalancing or creating significant problems between the environment and man.⁷ Studies undertaken in the land capability analysis usually vary depending on the location of the study area, time constraints and financial constraints. In most analyses the soils, slope, surface, and sub-surface geology of a study area are inventoried. Information obtained from a land capability analysis can then be translated into development standards (i.e., performance standards and specification standards). Among areas for which development standards can be applied are: sedimentation control, stormwater runoff, clear cutting, and wastewater treatment.⁸

⁶Boyd R. Dethero, "Development Planning in Environmentally Sensitive Barrier Islands: A Case Study of Kiawah Island" (Master's Thesis, The University of Tennessee, Knoxville, 1983), p. 22.

⁷Ibid.

⁸Ibid., pp. 22-23.

Land Suitability

A land suitability analysis, unlike the land capability analysis, considers human and social factors as well as the physical characteristics of a study area. Land suitability is defined as

the ability of a natural system to accommodate a desired use of the human community without the necessity for extensive artificial measures to develop or maintain the human use desired.⁹

A land suitability study is an analysis that interrelates the capability analysis to the human and socioeconomic desires of society placed upon the land to accommodate differing degrees of urbanization. Information obtained from a land suitability analysis can also be translated into development standards. Development standards derived from a land suitability analysis can be used to aid in the construction of drainage provisions and service requirements (i.e., sewage and water). A land suitability analysis also considers factors such as a development's juxtaposition to schools, recreation facilities, shopping facilities, transportation networks and existing as well as future residential developments.¹⁰

A problem associated with both the land capability analysis and the land suitability analysis is that neither technique provides a quantifiable estimate of just how much development can take place in an area before permanent environmental degradation occurs. The carrying capacity concept provides such a quantification.

⁹Richard W. Zelinski, "Evaluative Dichotomies in Resource Development" (Major Paper, The University of Tennessee, Knoxville, 1977), p. 12.

Carrying Capacity

The concept of carrying capacity was first developed and used in the field of the ecological sciences. Carrying capacity, when used in an ecological context, refers to an equilibrium among nature's many life forms and the environment. For example,

grazing land is said to be stocked at its carrying capacity when a given number of animals with known daily nutritional and water requirements is in equilibrium with or does not exceed the actual land productivity for forage and water on a sustained yield basis.¹¹

Carrying capacity, when used in an urban planning context, becomes more difficult to define. Bishop, realizing the inadequacies of the traditional carrying capacity when applied to the dynamic structure of the urban system, created a more appropriate definition. Bishop defines carrying capacity as:

a variable which is essentially socially determined within our understanding of economic, social, and environmental values and their relative contribution in maintaining quality of life levels. It is that level of human activity (including consideration of import and export of resources and water residuals) at acceptable 'quality-of-life' levels in perpetuity.¹²

Carrying capacity attempts to control urbanization given socio-psychological, environmental/ecological, economic and political variables.

¹¹Ibid., pp. 24-25.

¹²A. B. Bishop, Carrying Capacity in Regional Environmental Management (Washington, D. C.: U. S. Environmental Protection Agency, 1974), p. 33.

A carrying capacity analysis must first begin with an environmental resource inventory. The analyst then determines the relationships between the identified environmental features and the possible land uses for a study area. Next, the most sensitive limiting resource is identified and used as the basis for defining the carrying capacity of an area. The final product would be a consumptive resource rate of an additional unit of development and multiple carrying capacity limits as defined by each critical resource. Generally, a wide range of growth thresholds will be identified, instead of one growth limit for each resource.¹³ The amount of development that is allowed to occur depends on three factors:

1. natural environmental characteristics--environmental carrying capacity,
2. attitudes and perceptions of area residents--perceptual carrying capacity,
3. a government's ability to provide services and to regulate development--institutional carrying capacity.¹⁴

Environmental carrying capacity. Environmental carrying capacity can be defined as the threshold at which development activity will create an undesirable change or changes in the environment.¹⁵ The environmental carrying capacity is based on the premise

¹³Ibid., pp. 28-29.

¹⁴Dethero, p. 25.

¹⁵Ibid., p. 26.

that the natural environmental features of an area serve as constraints to development. A major assumption of the carrying capacity concept is that existing levels of economics, technology, and life styles will remain constant in the future. If the assumptions are altered, the constraints of the natural features can be extended.¹⁶ The environmental planning process concept should be applied in three situations. These are

1. development in an environmentally sensitive area,
 2. development based on environmental protection standards,
- and
3. development in areas where extreme limitations exist.

Development in environmentally sensitive areas. In this situation, the environment can only withstand minor development activity before changes occur in the physical, ecological, and biological features inherent in the development area. In this case, little or no development is acceptable given that the environment is highly susceptible to change. Examples of such sensitive environments are wetlands, estuaries, and floodplains.¹⁷

Development based on environmental protection standards. The second situation, and the one that is most common, is based on the premise that development is allowable, but only in accordance with predetermined environmental protection standards. The standards

¹⁶Ibid.

¹⁷Ibid., pp. 26-27.

are devised to protect against environmental degradation and to set allowable limits of change. Once the standards have been set it is only then a matter of applying those standards to existing conditions and then determining the amount of unused capacity available in an area.¹⁸

Development in areas where extreme limitations exist. The third situation is directly related to resource management and involves the ability of the environment to handle a new activity until that activity becomes self-limiting. The environment imposes a self-limitation on development activity when the addition of one consumptive unit or more leads to the depletion of resource availability.¹⁹

Perceptual carrying capacity. Perceptual carrying capacity analysis is highly subjective in nature. "The perceptual analysis is based on the amount of activity or the degree of change which can occur before one perceives the environment as different than before."²⁰ The concept has been applied to wilderness areas in an attempt to determine recreation absorption capacities, as well as in determining an area's ability to accommodate differing intensities of development. Perceptual carrying capacity is subjective given that the analysis is based on expressions of public attitudes and values.

¹⁸Ibid., p. 27.

¹⁹Ibid., pp. 27-28.

²⁰Ibid., p. 27.

Information for perceptual carrying capacity analysis is usually obtained by public surveys; with photographs of differing levels of urbanization included in the survey to obtain respondents' perceptions or reactions on varying degrees of development. Next, the perceptions/reactions of those surveyed are applied to land areas that are under development considerations. The final product is a composite map of respondents' perceptions toward different environments and how they perceive future development should take place in those environments.²¹

Institutional carrying capacity. Institutional carrying capacity may be defined as a community's ability to govern development.²² Communities will vary in their ability to direct and guide development towards public goals and objectives. Some communities may have the ability to arrange inter-governmental agreements while others may have only the ability to devise and pass basic zoning and subdivision regulations. The ability of a community to govern development usually depends on the strength of its three sub-institutional agencies. These sub-institutional agencies are

1. agencies involved in the planning functions of a community;
2. specialized agencies that deal with health services, education, etc.; and

²¹Ibid.

²²Ibid., p. 31.

3. all other private/public agencies and organizations that are involved in or interested in community development.²³

In order for a community to have a strong/high institutional carrying capacity, at least two of the three sub-institutional agencies would have to be strong and highly active in the daily community decision making process.

Current Carrying Capacity

The current carrying capacity approach can be thought of as a combination of the environmental carrying capacity approach and the institutional carrying capacity approach. Current carrying capacity is defined as "the measure of a region's ability to accommodate growth, and development within limits defined by existing infrastructure and natural resource capabilities."²⁴ Three factors used in measuring the current carrying capacity of an area are:

1. water supply,
2. water quality, and
3. air quality.

There are many proxy variables that can be used to measure the current carrying capacity of a site or community. However, not all of the possible proxy variables are equally good as indicators of natural resource availability. Technological capacity, public fiscal

²³Ibid.

²⁴George H. Nieswand and Peter J. Pizor, "How to Apply Carrying Capacity Analysis," Environmental Comment (December 1977), p. 8.

capability, and public health and safety needs could be used, but they are not as good as water supply, water quality, and air quality. Also, it is believed that any growth control ordinances based on the three measurement criteria insures the legality of those ordinances.²⁵

Steps involved in calculating current carrying capacity. A current carrying capacity value is arrived at by calculating a value for each measurement variable and then selecting the most limiting of the three values as an overall carrying capacity limiting value.²⁶ A five step process is used in determining the values for each measurement variable.

First, the determination of resource boundaries for each factor is established. Natural features such as ridge lines or watersheds provide natural area boundaries.

Second, the quality and quantity of each resource needs to be determined. Water supply can be determined by measuring the flow of water through a pipe line system, a reservoir allocation, or the production capability of an aquifer. Water quality can be measured by considering septic tank suitability of the soil, sewage treatment plant capacity, or the capability of a stream to maintain its quality under development pressures. Air quality can be determined by measuring sulfur dioxide levels, or suspended particulate levels and

²⁵Ibid.

²⁶Ibid., p. 9.

by comparing those measurements to pre-determined deterioration increments or standards.

The third step involves the transformation of current capacity limits for each factor into its population equivalent. In order to do such a transformation, estimates of per capita consumption rates for resources and per capita generation rates of waste must be determined. The rates will vary considerably depending on the amount of industrial/commercial activity and the amount of residential development that exists in a study area or community. Thus, any model calibration should be based on local situations and not national standards.

The fourth step involves the selection of the carrying capacity most limiting value as a determinant of the gross carrying capacity of a study area. The fifth step involves the comparison of the current carrying capacity value with the existing demand (measured in population equivalents) of the study area. The final product should be an estimate of the net current carrying capacity for the community. If the current carrying capacity value is negative, then development limits have been reached; however, if the number is positive, then an excess development capacity exists in the study area.²⁷

It is important to note that a current carrying capacity value is not a number which establishes a permanent carrying capacity for a study area, community, or region. The current carrying

²⁷Ibid.

capacity concept provides a yardstick indicating the relationship between the supply of resources and the demand placed upon that supply by growth and development.²⁸

Environmental Planning Methodologies: The McHarg Approach

Ian McHarg, in his book Design With Nature, was one of the first to stress the coordination of natural process analysis with the traditional land use planning process. McHarg's environmental planning methodology is based on the premise that natural environmental features should determine acceptable levels and types of land uses.

According to Belknap, McHarg's environmental methodology is important given that:

It requires an understanding of nature as a process, and it reveals causality. It requires the analyst to interpret natural processes as a resource, and hence to predict and prescribe compatible communities of prospective land uses. It also provides an insight into the given or natural form of the environment and thus provides implications for the man-made form or design through a better understanding of the forces at work. Finally, with the addition of information on demand and investment, McHarg feels that he can produce land-use plans for a wide range of areas.²⁹

The output of a McHargian analysis is systematically mapped environmental variables such as hydrology, climate, geology, soils, and land use. Next, color coded values are assigned to those

²⁸Ibid.

²⁹Raymond Belknap and John G. Furtado, Three Approaches to Environmental Resource Analysis (Washington, D. C.: The Conservation Foundation, 1967), p. 62.

variables and mapped. Once the values are assigned to the maps they are overlaid to create one map that usually displays areas that are suitable for development and those areas that are not suitable for development.

Raymond Belknap provides a diagrammatic outline (Figure 1) and an indepth analysis of the McHarg Environmental Planning methodology. The following discussion of the McHarg procedure is based on the coding system used in the diagrammatic outline.

A. Define The Study Area

The study area may vary in size from a region to a community, to an individual site located within a community. Man-made boundaries and natural environmental features are used to delineate study areas and sub-areas of study.

B. Natural Environmental Features are Inventoried

1. Collection of data. McHarg considers the collection of data on the following categories to be essential: climate, historical geology, physiography, hydrology, pedology, plant association, animals, and land use. McHarg suggests that data be collected in this sequence because it infers causality. Thus, by first analyzing the climate and historical geology of an area, a better understanding of the physiography can be gained. Furthermore, an analysis of the physiography allows for the interpretation of the hydrology, the pedology, and so forth. It is McHarg's contention that "knowledge of the history of the listed categories is a background for the

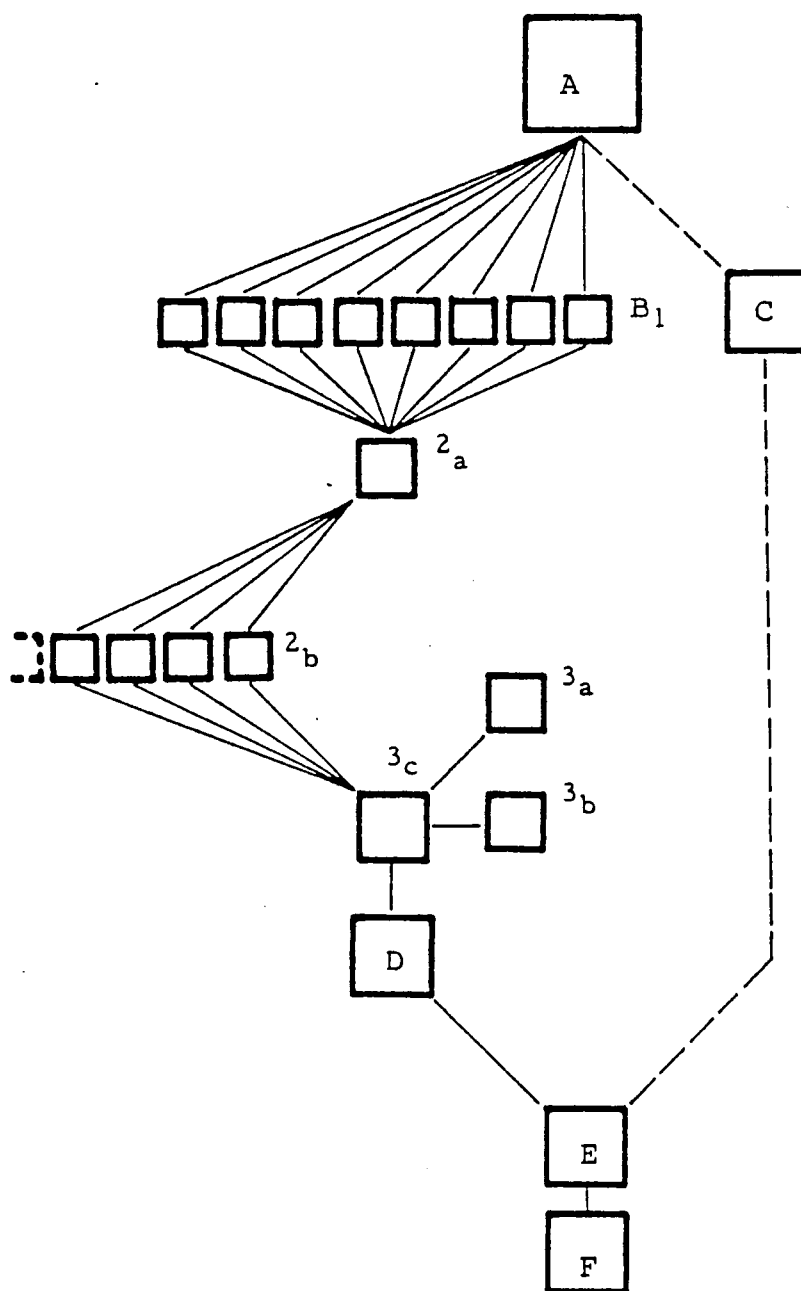


Figure 1. Diagrammatic Outline of Analysis Procedures.

Source: Raymond Belknap, Three Approaches to Environmental Resource Analysis (Washington, D. C.: The Conservation Foundation, 1967).

comprehension of further information."³⁰ The importance of this step is that it identifies the resource supply of a study area, which can then be compared to the demand for those resources.

2. Inventory data is interpreted and analyzed in respect to its possible land uses.

a. The aforementioned environmental features are analyzed for their positive, neutral, or negative effects on prospective land uses. For example, the slope of a ridge might be too steep for residential development but is well suited to handle recreation activities. A comprehensive matrix is used to analyze the effect of possible land uses on each resource area.

b. In this step, intrinsic suitability maps are created and analyzed. A series of maps locating the natural and unique environmental/man-made features (i.e., slopes, historic buildings, economic minerals, and water resources) as well as maps for agriculture, forestry, recreation and urbanization are produced identifying the best prospective land use for every sub-area of the entire study area.

3. Value assignment. Every sub-land area of the entire study area is assigned a value for all of the possible land uses that could be ascribed to that sub-area.

a. A rating system based on established values is constructed. The values of the intrinsic resources are then mapped and superimposed.

³⁰Ibid., p. 66.

The output is one map that shows areas of most social value in the darker tone and areas of least social value in the lightest tones.

b. Groupings by incompatible and compatible land uses are determined. A matrix approach is used to separate prospective and existing incompatible and compatible land uses by resource suitability. The matrix allows for the intercompatibility of all land uses; thus allowing for the identification of the most compatible combination of resource and land use(s).

c. Data is interpreted and synthesized into a combined suitability map. The purpose of this step is to demonstrate the "maximum conjunction of coexisting, compatible land uses that can be sustained in every area in the total study area."³¹ The suitability map is divided into four possible land uses:

1. agriculture,
2. forestry,
3. recreation, and
4. urbanism, and their sub-dominant land uses.

The suitability map represents the entire natural environmental supply inventory and analysis for the study area.

C. An Economic Inventory is Conducted and Interpreted

This step should be conducted by a regional economist or an economic planner. The task is to provide information on locational values and the spatial relationships of demand. Once the inventory

³¹Ibid., p. 69.

is completed, the demand for the natural resources is compared to the supply of the natural resources and interpreted.

D. Visibility Criteria are Established

This step involves an analysis of the visual values in relation to proposed land uses. Factors that must be taken into account when visually guiding future development are:

1. visual path of the observer (e.g., water, road, rail),
2. visibility of the viewer, from his/her vantage point or location, will vary with the physiography of an area,
3. the effect of vegetation as a visual barrier independent of physiography, and
4. the ability of a forest to handle development while preserving the natural characteristics of a forest life. The consideration of such a factor could aid in the determination of density controls for development.

E. Design and Form Criteria are Established

This step brings the economic, visual, and environmental components of the planning process together. These factors are combined to determine the form of various land use spaces. Produced in this step are development plans for prospective land uses.

F. Implementation Powers are Acquired

McHarg's implementation strategy stresses the need for adequate capital in order that land can be acquired or that improvements

on land can be made. He also stresses the need for the enforcement of necessary regulatory and zoning ordinances.³²

Ian McHarg's environmental planning methodology serves as the basic foundation for most environmental analysis. However, this is not to say that McHarg's work has not come under criticism by various professionals.

McHarg is mostly criticized for his total ecological approach. McHarg places much less value on socioeconomic, cultural, and human factors that shape values and consequently affect natural processes. Furthermore, he has been criticized for conducting his supply side ecological analysis independent of the demand analysis. Consequently, in light of these criticisms, different and/or modified McHargian approaches have been developed by various individuals and agencies.³³

Environmental Planning Methodologies: The Ohio Department of Natural Resources

In the early seventies, the Ohio Department of Natural Resources established a land suitability analysis system which was capable of evaluating the ability of land to accommodate various types of development. The system not only looked at physical capability but also considered the location of the existing transportation network, public utilities and services, future population, noise, and visual disorders. The system also considered the residential,

³²Ibid., pp. 66-73.

³³Ibid., p. 91.

industrial, recreational, agricultural, and conservation needs of the community or region. The Ohio Department of Natural Resources developed a land analysis system that linked the man-made features of the environment with the results of a land capability analysis. The difference between this approach and the McHargian approach is that the Ohio Department of National Resources places a greater emphasis on the importance and effect of man-made and human factors on the natural environment.³⁴

The analysis procedure followed by the Ohio Department of Natural Resources consists of five basic steps:

1. define the geographic area,
2. inventory physical data,
3. assign values to physical information,
4. project land use needs, and
5. prepare composite suitability/capability maps.³⁵

Only steps three and four will be discussed given that steps 1, 2, and 5 are basically covered in the McHargian approach.

Assign Values to Physical Information

In this step criteria of suitability values are assigned to physical information. The relationship between a study area's physical features and aspects of development are coded in terms of values and expressed in terms of suitability. For example, the

³⁴Rogers, pp. 41-42.

³⁵Ibid., p. 42.

criteria of suitability for residential development could include: conflict aversion with existing or proposed commercial or industrial development, development should not occur in hazard prone areas, or that a proposed site must be able to accommodate underground activities. Some other land use categories for which criteria can be established are: recreation, agricultural, transportation, conservation, industrial, commercial, and waste storage.

Project Land Use Needs

Step four involves the determination of land use space needs based on population and economic projects. The purpose of this step is to determine future space needs for all major land use categories. The importance of this step is that it incorporates a future orientation or dimension into the land capability/suitability analysis.³⁶

Environmental Planning Methodologies: William Marsh's Analysis

Marsh's environmental methodology is based on the premise that one must view the landscape as a dynamic process. Marsh states that, "Processes must be treated together with forms and features revealing the vital relationship between an event and its setting."³⁷ According to Marsh, there are three basic methods that can be used to conduct an environmental analysis:

³⁶Ibid., pp. 43-44.

³⁷William M. Marsh, Environmental Analysis for Land Use and Site Planning (New York: McGraw-Hill Book Company, 1978).

1. the identification of environmental constraints (capability analysis),
2. the identification of environmental opportunities (suitability analysis), and
3. the prediction of environmental impacts.³⁸

The third analysis method will only be reviewed given that the basic context of the other two suggested approaches have been reviewed in the McHargian (capability) and Ohio Department of Natural Resources (suitability) approaches.

The Prediction of Environmental Impacts

The purpose of an environmental impact analysis is to identify possible changes in environmental features that would occur as a result of proposed development actions. According to Marsh, there are three unique characteristics that best describe the environmental impact assessment approach.³⁹

First, embedded within the environmental impact analysis approach is the environmental constraints approach and the environmental opportunities approach. The impact analysis approach focuses on predicting both desired and undesired consequences of a proposed action. The incorporation of the first two approaches is achieved because some of the consequences will evolve into environmental opportunities while other consequences will act as environmental

³⁸Ibid., p. 198.

³⁹Ibid., pp. 204-205.

detriments. However, what makes the impact analysis approach unique is that it identifies all significant environmental consequences and not just those consequences that are identified as opportunities or constraints.⁴⁰

Second, impact assessments are used to compare and contrast alternative proposals in order to determine which proposals would have the least or greatest impact upon the environment. The illumination of alternative proposals allows for a more efficient and accurate decision making process, which in turn leads to better environmental impact decisions.⁴¹

Finally, the impact approach requires information on environmental processes over time. Descriptive inventories of existing conditions are not enough, unless environmental conditions are stable and relationships with a proposed action are clearly identifiable. However, impacts on more complex and active conditions, such as an ecological system, requires time interval information.⁴²

Marsh places a great deal of emphasis on analyzing environmental impacts over time. Consequently, Marsh frames his discussion of impact assessment within a simpler version of the planning process. He divides the process of planning into four major components:

1. problem identification,

⁴⁰Ibid., p. 205.

⁴¹Ibid., p. 206.

⁴²Ibid., p. 205.

2. formulation of alternatives,
3. impact analysis, and
4. evaluation of trade-offs.

Each step is interrelated and in essence occurs simultaneously.

The change from one step to another occurs only in emphasis. Once placed within the context of the planning process, an impact assessment analysis is composed of six steps:

1. the identification of evaluative factors;
2. the identification of systems and dependent/independent relationships among evaluative factors,
3. development of alternative scenarios of desired features,
4. prediction or identification of impacts of each alternative,
5. the identification of trade-offs among alternatives and scenarios, and
6. an evaluation, by either a matrix or listing approach, of the differences among alternatives or scenarios.⁴³

The end result of such a process is a longitudinal impact assessment approach that not only identifies the impacts of each alternative or proposal but also identifies the optimum combination of proposal elements.

⁴³Dethero, pp. 48-49.

Environmental Planning Methodologies: Phillip H. Lewis
(Visual Landscape Analysis)

Lewis' work is based on visual observation of environmental features. The objective of the study is to identify and evaluate landscape features or environmental opportunities which add to the aesthetic quality of the environment. Even though Lewis' work focuses on identifying and preserving natural outdoor recreation space, his work can be generalized so as to encompass the broader concerns of urbanization and environmental sensitivity.⁴⁴

The Lewis methodology focuses on identifying natural resources on the basis of their intrinsic values, resources that are perceptually pleasing, and extrinsic values, cultural/recreational amenities modified or added to the environment by man. Resources that are inventoried depends greatly on the area under investigation. In general, such features as ridgelines, water bodies, flood plains, wetlands, major transportation corridors, cultural features, and soils are usually inventoried.⁴⁵

Once all surveys are complete and resources are inventoried, they are mapped on transparent overlays as nodes and corridors. Corridors usually represent natural features such as rivers/streams, ridges, and valleys. Nodes are usually concentrated resources located within corridors. The next step involves the assignment of

⁴⁴Belknap and Furtado, p. 31

⁴⁵Ibid., p. 32.

values and priorities to major and additional resources, with the assigned values being totaled to determine relative priority areas. The final step involves the establishment of demand for planned uses, the determination of priority and land use/development limitations and the determination of acceptable land uses.⁴⁶

Development Standards Theory

Standards: A General Description and Definition

According to Chapin, "Standards are yardsticks established for measuring quality in elements of the community's makeup, in this case the quality of locations of land-using activities."⁴⁷ There are several different types of standards, the majority are based on a minimum standard being set. Some of the most readily used standards include location standards, convenience standards, performance standards, and specification standards. The standards to be discussed are specification standards and performance standards.

A specification standard usually calls for a minimum or maximum feature.⁴⁸ For example, given the importance of a primary dune as an erosion control mechanism, no development would be allowed on or in front of any primary dune line. A specification standard

⁴⁶Ibid., pp. 33-34.

⁴⁷Chapin and Kaiser, p. 369.

⁴⁸Charles Thurow, William Toner, and Duncan Erley, Performance Controls for Sensitive Lands, A Practical Guide for Local Administrators, Parts 1 and 2 (Chicago: American Society of Planning Officials, Planning Advisory Service, 1975), Report Nos. 307, 308, p. 95.

emphasizes the solution characteristics to any development concern or environmental/socioeconomic feature.⁴⁹

Specification standards first appeared in building codes and also appeared in the early zoning ordinances. The desired pattern of land use is determined by specifying locations and development types through zoning, and other regulatory instruments. In essence, the early zoning ordinances consisted of use lists which indicated what uses were allowed in what zones. However, over the past decades specification codes have been used less, while performance codes have been and are being used more and more. Such concepts as planned unit development, floating zones, special use permits, and market feasibility studies have been used in an attempt to regulate development on the basis of its performance.⁵⁰

Performance standards are concerned with "the specification of desired results, with the means for achieving them left open."⁵¹ Consequently, development could occur in hazardous areas (e.g., floodplain, steep ridge) if the development is designed to decrease the chance of property damage below a certain level and given that development does not impede natural environmental processes.⁵²

⁴⁹Chapin and Kaiser, p. 371.

⁵⁰Thurow, Toner, and Erley, p. 95

⁵¹Chapin and Kaiser, p. 371.

⁵²Ibid.

In land use planning, performance standards were first used to aid in the location of industrial activity.⁵³ They have since become widely used as a means of protecting environmentally sensitive areas. The use of performance standards by a community allows an opportunity to identify the natural features it wishes to preserve, as well as provide the land owner flexibility in his/her land use decisions.⁵⁴

The goal of environmentally sensitive regulations is to maintain the natural processes of the environment as it interacts with the processes of urbanization. Protection of natural environmental processes by traditional zoning has not been effective because natural process protection is only implemented by listing land uses that will probably have an impact on the environment. Land uses that will have less impact on the environment are also listed.⁵⁵ Impacts are said to be limited by only allowing uses such as agriculture, recreation, and conservation on the most environmentally sensitive land. Uses associated with a great deal of construction activity (i.e., commercial, industrial, residential development) are placed on less environmentally sensitive land. Land use specification is, however, only a crude implementation instrument for protecting environmental processes.⁵⁶

⁵³Thurow, Toner, and Erley, p. 96.

⁵⁴Ibid., p. 1.

⁵⁵Ibid., p. 95.

⁵⁶Ibid., pp. 95-96.

The reasons for land specification being a weak implementation device are three fold:

1. Permitted uses do not assure that compatibility with natural processes will be maintained. Improper development of agricultural and recreational resources can do as much harm or damage as constructing residential or commercial facilities on sensitive land.
2. Use segregation, in most cases, does keep identified negative uses away from sensitive environmental features. However, it also reduces the supply of commercial, industrial, or residential land that, if properly developed can be used in a compatible fashion with natural environmental processes.
3. Land use segregation is based on the premise that buildable and nonbuildable land are separate systems and that encompassing land uses will not affect the area of concern. This premise is not necessarily true given that the groundwater recharge and withdrawal, amount of erosion or runoff of an entire area, can be effected by one large development.⁵⁷

Consequently, in order to make land use controls more responsive to the goal of environmental protection and more flexible to the land owner, communities began to integrate performance standards into land use control ordinances.

The use of performance controls in land use ordinances has not replaced traditional zoning, but instead has been added to the existing zoning ordinances and land use lists. As stated by Thurow,

Through these provisions, a land owner may use his land for uses other than those specified in the ordinance if he meets specific environmental performance criteria. These criteria generally delineate the key functions that the community wishes to preserve, such as the water retention capabilities

⁵⁷Ibid., p. 96.

of wetlands. The landowner is allowed to develop the land any way he wishes if he can show that it will not adversely affect these natural processes.⁵⁸

The integration of performance standards does bring the land use controls system closer to overcoming the second weakness of the traditional zoning ordinances by not artificially limiting the supply of land. It does not, however, contend with the other two problems. In order to do so, direct environmental performance standards regulations would have to be implemented.⁵⁹ An important point to remember about performance and specification standards is that neither should be used by itself. In most cases, as is the case on Hilton Head, both types of standards are used. In general, specification standards are usually used in the preliminary stages of land use planning. Conversely, the performance standards are more suited for the advanced stages in conjunction with land use controls.⁶⁰ Thus, it is not a case of using one or the other, but both, and which standard you use and when you use it depends on the stage of the planning process and the utility of the standard or methodology being used.

⁵⁸Ibid.

⁵⁹Ibid.

⁶⁰Chapin and Kaiser, p. 372.

The Gardner Matthews Plantation Planning Process

The Gardner Matthews Plantation planning process began with the development concept. The concept was based on the premise that the market should determine acceptable densities and types of land uses. The Gardner Matthews Plantation concept was a reflection of market demand and was designed to maximize its marketability.⁶¹

The Hilton Head Island market, as defined by Island residents and future potential consumers was a market that demanded an aesthetically appealing unobtrusive blend of urban development with the natural environmental features of the Island. However, a thorough environmental analysis was not included in the Gardner Matthews Plantation planning process.

The Gardner Matthews Plantation environmental analysis technique did not have the depth or scope of the other previously described environmental methodologies. In essence, the technique consisted of one basic step. The Gardner Matthews Plantation environmental analysis consisted of an environmental features inventory. Included within the inventory was a topographic survey, a tree survey and a wetlands survey.⁶²

The tree survey was done in order to identify and to preserve trees of exceptional size, shape, and age; and to identify those trees that are considered to be healthy and those that are not

⁶¹Interview with Bruce Black and Ken Skodacek, The Hilton Head Company, Hilton Head Island, South Carolina, March 1984.

⁶²Ibid.

healthy. Also, trees to be saved were marked in order to minimize the number of trees effected by development activity.

The wetland survey was conducted in part because federal legislation requires the Hilton Head Company to do so and also because the Hilton Head Company perceives an opportunity to gain from the plantation's wetland areas. The wetlands were preserved because of their environmental significance as sanctuaries and breeding grounds for Island wildlife and for their natural drainage retention capacities.

A topographic survey was also conducted for the plantation. The topographic survey compliments the wetland survey in that land elevations were determined and natural drainage patterns were identified.

At this point in the process a land use analysis was conducted. Incorporated within the land use analysis was a property survey and a land use inventory. An economic analysis was also performed. Hilton Head company architects are responsible for conducting the environmental, land use, and economic base studies.

Upon the completion of all base studies, a preliminary plat was drawn and sent to the Beaufort County Planning Commission for approval. Once approval was received, Hilton Head Company Management personnel then changed and refined various design elements of the original plat.

Pending barrier island legislation necessitated the bypass of management input during the original plat design process. The barrier island legislation, if passed, would have limited development on

Hilton Head Island and consequently jeopardize the entire Gardner Matthews Plantation project. Consequently, a plat was designed very quickly and submitted for approval in order to establish a vested interest for the Hilton Head Company. If such legislation had been passed, then the Hilton Head Company would have based its right to develop the plantation on its established vested interest.⁶³

The management personnel who changed and refined the preliminary plat were Dave Axene, President of the Hilton Head Company; Al Jones, Manager of Marketing and Real Estate; Bruce Black, Manager of Planning and Governmental Affairs; and Willard Byrd, Landscape Architect and Planner. These four individuals changed and refined where necessary the original plat in order to better reflect market, legislative, and personal considerations.

Once development alternatives were narrowed and the direction of development was decided, the manager of the engineering department and the accounting department were brought into the development planning process. The head engineer along with company architects prepared a preliminary development cost estimate and began to incorporate the technical aspects of development into the design process. Accounting prepared a cost/revenue projection based on revenue data provided by the manager of marketing and real estate and cost data provided by the managers of engineering and architecture. Accounting also determined how much could be spent on the project by the Hilton Head Company.

⁶³Ibid.

Next, a new plat was drawn up and sent back to the management team for review. After the plat was critiqued, it was sent back to the architects to have the desired changes incorporated. In the case of Gardner Matthews Plantation, three to four review/critique sessions were held before the plat recieved Hilton Head Company management approval. Upon receiving Hilton Head Company Management approval, the plat was sent in succession to the Emerald Land Company, Marathon Petroleum, and finally to the U. S. Steele Corporation. These three companies are the parent companies of the Hilton Head Company. Once approval was received from each of those three companies, the Hilton Head Company then sought plat approval from the Hilton Head Island Planning Commission. When approval was received, the entire engineering department along with the real estate and marketing departments were brought into the planning process. Once these three departments were included in the planning process, the implementation process began and will continue until all lots are sold.

Figure 2 provides an outline of the Gardner Matthews Plantation planning process.

Issues and Problems

There is no "defined" planning process used by the Hilton Head Company. The specifics of each individual development tend to determine the planning process for that development. Factors that can influence and ultimately change the project planning process are time, internal company politics, the development stages of other

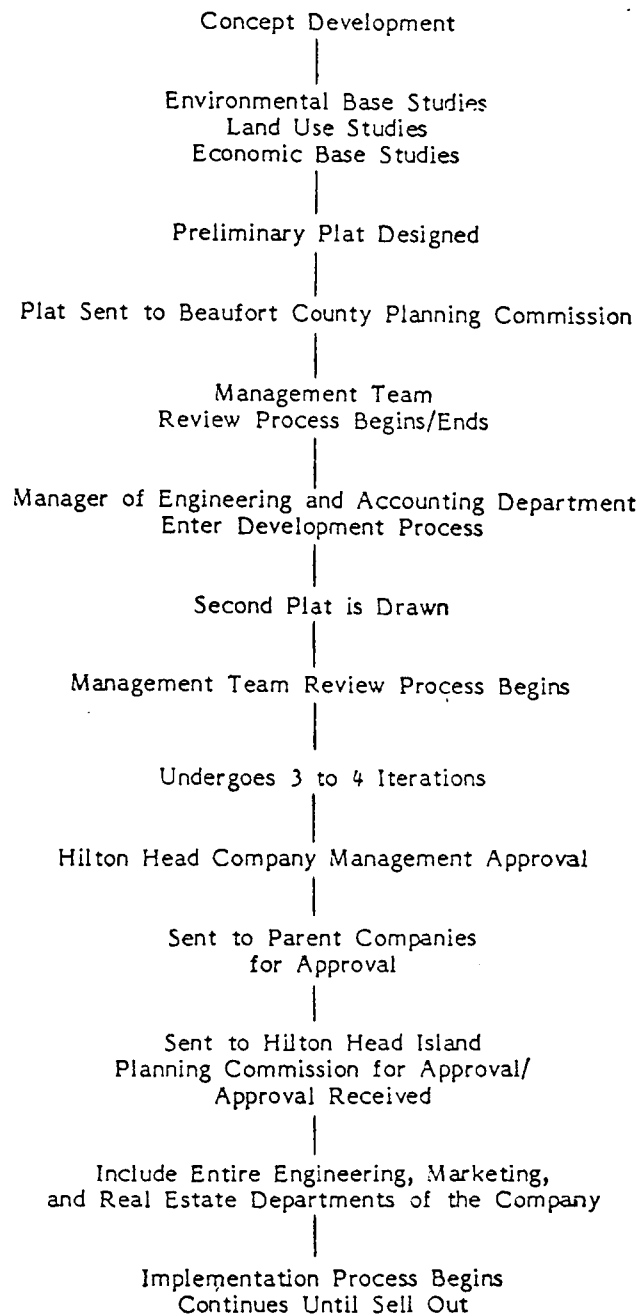


Figure 2. The Gardner Matthews Plantation Planning Process

Source: Bruce Black and Ken Skodacek (Interview), 1984.

company plantations, and local, county, regional, state, and federal politics/legislation. For instance, due to federal barrier island legislation, the Gardner Matthews Plantation planning process included two preliminary plat design stages, while other plantation planning processes included only one preliminary plat design stage. Also, the order and timing in which company actors became involved changed from one development to the next. For example, the engineering department of the Hilton Head Company came in early for the Wexford Plantation planning process, while in the Gardner Matthews Plantation planning process the engineering department was brought in much later in the process. Generally, internal company politics determine the order of company department involvement in a project. Overall, public politics, local, and federal legislative action and internal company politics have had and continue to have the greatest impact on the Hilton Head Company planning/development process.

The Gardner Matthews Plantation Requirements

It is impractical to list and describe all of the development standards that apply to Gardner Matthews Plantation. Consequently, the more significant development standards as described in Chapter One will be reviewed. The development provision review will describe the general requirements of each selected provision and will also consider, if clarification is needed, the intent or purpose of each selected provision.

Drainage

Drainage is a major issue on Hilton Head Island. The general drainage provision requires that all developments be constructed so as to restrict runoff to adjoining property, accommodate the 25 year storm, and be constructed so that the flood potential within a development does not appreciably increase.⁶⁴

There are many drainage standards applicable to Island development. One of the more important drainage standards deals with the control of stormwater runoff. The provision requires developers to provide for "on-site retention (dry or wet) or percolation areas for, at a minimum, one (1) inch of runoff from impervious surfaces on the site."⁶⁵ For a PUD or plantation, on-site retention is anywhere within the property boundaries of such PUD or plantation.⁶⁶ The methods of retention or handling are left open; however, all methods must be approved by the town engineer. Possible methods include: retention and detention ponds, wet lands, drainage easement, underground storm water easements, and open channel easements.

The purpose of the drainage provision is three-fold. First, it is hoped that the implementation of such standards will aid in the control of plantation and Island flooding. Secondly, it is anticipated that retained storm water will percolate and aid in the replenishment of the Artesian Aquifer, the Island's main water

⁶⁴The Municipal Code of the Town of Hilton Head Island, South Carolina, 1983, p. 197.

⁶⁵Ibid., p. 201.

⁶⁶Ibid.

source. Finally, it is expected that the retention ponds, drainage easements and wetlands will act as filter mediums and remove oil, grease, gasoline, particulates, and other organic matter before the storm water runoff enters any natural or manmade water body.

Another important drainage provision deals with impervious surfaces. All Hilton Head Island developers are required to provide a map of all impervious surface areas. Impervious surfaces include: paved parking areas, streets, roads, curbs, roofed areas, sidewalks, patios, covered walkways, bike or pedestrian paths, and paved recreational areas.⁶⁷ The maximum allowable impervious site coverages area as follows:

1. No commercial, industrial, office, motel, hotel, or mobile home park site will be approved which contains more than sixty (60%) percent or an equivalent of sixty (60%) percent coverage by impervious material surfaces.
2. Sites of up to and including four (4) dwelling units per acre will have no more than forty-five (45%) percent or an equivalent of forty-five (45%) percent coverage by impervious surface.
3. Sites of five (5) to eight (8) dwelling units per acre will have no more than sixty (60%) percent coverage by impervious surface or an equivalent of sixty (60%) coverage.
4. Sites of nine (9) to fifteen (15) dwelling units per acre will have no more than sixty-five (65%) percent or an equivalent or sixty-five (65%) percent coverage by impervious surface.
5. Sites of sixteen (16) and above dwelling units per acre will have no more than seventy-five (65%) percent or an

⁶⁷Ibid., p. 200.

equivalent of seventy-five (75%) percent coverage by impervious surface.⁶⁸

The major intent of the impervious surface provision is to limit the amount of storm water runoff and consequently decrease the potential for flooding. Another intent of the provision is to encourage the use of porous site surface materials.

The major problem with the drainage provision(s) is that the Island drainage requirements are designed to handle drainage problems on mainland environments and not for an Island environment.⁶⁹ With or without development, such a wetland environment will have periodic problems with flooding.

Density

Hilton Head Island consists of 20 land use districts. All but three of those 20 land use districts have a dwelling unit limitation of four units per gross acre. The remaining three land use districts have a dwelling unit limitation of eight units per gross acre. In the case of a PUD or plantation

the total gross distribution of population may be allocated in any manner, so long as the total number of units to be developed is within an overall population cap to be determined as the product of the gross acreage of the PUD times the permissible population level for that district in which the PUD or plantation is located.⁷⁰

⁶⁸Ibid.

⁶⁹Interview with Bruce Black and Ken Skodacek, March 1984.

⁷⁰The Municipal Code of the Town of Hilton Head Island, South Carolina, 1983, p. 220.

The purpose of the dwelling unit limitation provision is to control residential development and consequently Island population growth. It is felt that by controlling development and population growth that some of the negative impacts of development will be alleviated and consequently that the Island's natural resources will be protected.

Open Space

Open space is defined as "all areas not utilized for buildings, sidewalks, roads and parking."⁷¹ Such areas include: lagoons, ponds, landscaped areas, wildlife preserves, wetlands, buffer areas, and recreational amenities such as swimming pools, tennis courts, and golf courses.

Open space requirements for PUDs/plantations vary based on the designated land uses and the distribution of population within the PUD or plantation. Required open space is measured as a percentage of total tract size.⁷² Table 5 lists the percent of open space required by land use and distribution of population.

The open space requirements are designed to create and preserve as much natural Island terrain as possible. The creation and preservation of open space is viewed as an environmentally sound practice because it allows for a more equitable mix of urban development with the Island's natural resources, which creates a more aesthetically

⁷¹Ibid., p. 221.

⁷²Ibid.

Table 5. Percent of Open Space Required by Land Use and Distribution of Population.

Land Use	Designated Units Per Acre	Percent of Open Space Required
1. Residential		
a. Single Family	Less than 2 du/acre [*]	N/A
b. Single Family	1-4 du/acre	10%
c. Multi Family	2 du/acre	20%
	3 du/acre	30%
	4 du/acre	40%
	5-8 du/acre	50%
	9-15 du/acre	60%
	16 & greater du/acre	70%
2. Institutional		10%
3. Commercial		20%
4. Industrial		30%
5. Hotel/Motel (equivalent to 40 percent of resi- dential units)		**

* du/acre = designated units per acre

** Required open space percentage of total hotel/motel tract is computed by division of the development distribution of population in hotel/motel units per acre by 2.5 and application of the resultant residential distribution of population requirement.

Source: The Municipal Code of the Town of Hilton Head Island, South Carolina, 1983.

appealing environment. Also, open space, especially forested open space, mitigates environmental problems created as a result of urbanization.

The issues and problems associated with the density and open space standards can be combined. The only issue or problem deals with the fact that those standards limit the amount of available land that can be developed. The end result of those provisions will be in theory to raise the price of developable land. The person or persons mostly affected by such development standards in theory are the consumer, for it is the consumers who will ultimately absorb the increased land cost.⁷³

In theory, such provisions affect the private developer in that the development company realizes a loss in profit when costs increase. This is based on the premise that the price of a developable land can only be raised by so much before it exceeds the target market. Therefore, the developer in theory cannot increase the price of developable land enough to recapture such loss.⁷⁴

Setbacks

Hilton Head Island setback requirements vary depending on land use classification and by the relationship of the proposed

⁷³Interview with Bruce Black and Ken Skodacek, March 1984.

⁷⁴Ibid.

development to existing development on contiguous property. Table 6 includes the setback requirements for Hilton Head Island.⁷⁵

Required setbacks are measured inward from the property line to the first vertical structure of six feet or more in height above finished grade.

Buffering

Island buffering requirements were established in order to preclude potential incompatibility between neighboring land uses of different types of intensity. The buffering requirements are included in Table 7.⁷⁶

Buffer standards are computed as a percentage of required setbacks. A buffer may lie anywhere within the required setback, but the buffer must be continuous.⁷⁷

Buffer open space is space which encompasses a tract of land and is contiguous to property lines owned by a different individual or party. Such space can only be used for landscaped areas, natural areas, forests, fields, orchards and farms, bike and pedestrian ways, sidewalks, lagoons and water run-off holding ponds, natural fresh water wetlands, wildlife preserves, and golf courses.⁷⁸

Non-buffer open space is "land restricted by the owner by recording in the public record a restrictive easement or covenants

⁷⁶Ibid., p. 219.

⁷⁷Ibid.

⁷⁸Ibid., p. 222.

Table 6. Setback Requirements for Hilton Head Island.

Proposed Use	Existing Adjacent Use					
	LR	MR	IR	HIR	C/I	INST
LR (Light Residential)	10	10	20	20	30	10
MR (Moderate Residential)	10	10	15	20	30	10
IR (Intense Residential)	20	15	10	15	30	20
HIR (High Intense Residential)	20	20	15	10	30	20
C/I (Commercial/Industrial)*	30	30	30	30	10	30
INST (Institutional)	10	10	20	20	30	10

* Required setback for hotel/motel uses are computed by dividing the hotel/motel density by 2.5 to determine the equivalent residential classification.

Table 7. Buffering Requirements for Hilton Head Island.

Proposed Use	Existing Adjacent Land					
	LR	MR	IR	HIR	C/I	INST
-- % of Table 6 Setback Requirements --						
LR (Light Residential)	0	50	60	70	80	50
MR (Moderate Residential)	50	0	60	70	80	50
IR (Intense Residential)	60	60	0	50	60	50
HIR (High Intense Residential)	70	70	50	0	50	50
C/I (Commercial/Industrial)*	80	80	60	50	0	80
INST (Institutional)	50	90	50	50	80	0

* Required buffers for hotel/motel uses are computed by dividing the hotel/motel density by 2.5 to determine the equivalent residential classification.

running with the land for 50 years or more."⁷⁹ Land uses are restricted in conformance with buffer open space, with the exception of the following uses: tennis courts, swimming pools, racquet courts, shuffleboard courts, dancing terrace, musical entertainment areas or other areas of crowd congregation, picnic areas, sports fields, horse pastures, private roads, lanes, and access ways.

Hard surface areas may not in total cover 40% of such non-buffered open space being restricted to landscaped areas, grassed areas, playing and sports fields, forests, fields, orchards, and farms.⁸⁰

Lot Design

The lot design criteria for the Town of Hilton Head includes the following three provisions:

1. lot configuration,
2. required services, and
3. monuments and markers.

Lot configuration. The lot configuration provision requires developers to pay special attention to the following aspects of lot design:

1. lot size, width, depth, shape, grade, and orientation to streets,
2. building setback lines,

⁷⁹Ibid., pp. 222-223.

⁸⁰Ibid.

3. separation of residential lots from major roads and other incompatible uses, and

4. separation of proper screening of non-residential development from adjacent existing residential development.⁸¹

Services. The Town of Hilton Head also requires the owner or developer of a parcel or tract of land to provide basic services.

The services that must be provided are:

1. Power supply, normally electricity,
2. Potable water supply of acceptable quality and of sufficient quantity to satisfy domestic needs,
3. Water supply of acceptable quality and quantity to satisfy commercial and industrial demand.
4. Means for treatment and disposal of domestic sewage and other liquid wastes, or the approval of the use of septic tanks, together with appropriate soil tests.
5. Means for collection and disposal of solid wastes except for single-family residential subdivision.
6. Water pressure and flow for firefighting, as approved by the appropriate Fire Official.⁸²

One Island service requires that all utility lines must be placed underground. The provision is that:

All electrical, telephone, and gas utility lines in a development shall be installed underground, except where a specific variance is granted from this section, according to plans and specifications, which are both in accordance with the provisions

⁸¹Ibid., p. 196.

⁸²Ibid.

of this chapter and approved by the respective utility companies providing such service.⁸³

The purpose of such a provision is to maintain the visually pleasing appearance of the Island and its plantations. Utility lines placed above ground are considered to be visually unappealing.

The only problem with the underground utility service is that it increases the cost to the utility companies by approximately 50 percent.⁸⁴ In theory, such an increase in cost is passed on to both the developer and the consumer.⁸⁵ The major issue then is whether or not the aesthetic benefits outweigh the increased cost.

Monuments and markers. The Town of Hilton Head also requires that all lots be identified by corner markers. Control monuments will be placed in the pavements of subdivision streets so that no lot is more than 2,000 feet from a control monument.⁸⁶

Erosion

Erosion and sedimentation controls are required "on all sites adjacent to waterbodies or drainage ways in which one contiguous acre or more of land surface is to be uncovered."⁸⁷ The ordinance

⁸³Ibid., p. 197.

⁸⁴Interview with Ed Evans, Palmetto Cooperative, Inc., Hilton Head Island, South Carolina, March 1984.

⁸⁵Ibid.

⁸⁶The Municipal Code of the Town of Hilton Head Island, South Carolina, 1983, p. 197.

⁸⁷Ibid., p. 207.

also requires that all uncovered areas of one contiguous acre not being developed be provided with ground cover or other protective measures (e.g., buffering) capable of restraining erosion and sedimentation.⁸⁸

Nuisances

Special nuisances are considered to be

certain uses of land, buildings and structures which would be harmful to the public welfare or would unnecessarily be deemed to endanger the health, safety and welfare of residents and property owners.⁸⁹

Special nuisances are divided into two categories:

1. Class A nuisances, and
2. Class B nuisances.

Class A nuisances are land use activities that create unnecessary risks of injury or damage to persons or property. Examples of such nuisances are:

1. the storage or use of combustible or explosive substances,
2. and activity which causes or which may cause or result in emission of a toxic or corrosive gas or chemical, and
3. any production, processing, or storage of nuclear materials.⁹⁰

⁸⁸Ibid.

⁸⁹Ibid., p. 209.

⁹⁰Ibid.

A Class B nuisance is a land use or activity capable of unnecessarily disturbing public or neighboring land uses or activities. Examples of such nuisances are: open storage yards (e.g., automotive junk, contractors materials, supplies and equipment, solid waste landfill areas, and depositories for chemical or other industrial or agricultural wastes, etc.), disturbing rays of light or point source illumination.⁹¹ All land uses and land use activities outlined above must be screened from view from any public highway, street or road, adjacent existing or approved residential, commercial, and institutional uses. Screening and buffering consists of natural and/or landscaped plantings or a combination thereof, including berms, walls, or fencing.⁹²

Safety

The fire safety provision includes standards on fire hydrant spacing and water line size. The fire provision that most effects Island development, however, is the building height restriction. That restriction requires that

no building shall be constructed with more than three habitable floors above one level of parking, but in no case shall the height of the building exceed 74 feet above pre-development grade.⁹³

⁹¹Ibid., pp. 209-210.

⁹²Ibid., p. 211

⁹³Ibid., p. 224.

Natural Resources

The residents of Hilton Head Island have a great concern for the protection of the Island's natural resources. Consequently, included within the development standards ordinance is a natural resource provision. Included within that section are standards prohibiting the clear-cutting of trees, provisions requiring a tree survey, and standards on the protection of trees.

The clear-cutting ordinance prohibits the clear-cutting of trees for the sole purpose of clearing land or offering land for sale. Exceptions include clearing for agricultural use, golf courses, construction, and road construction purposes.⁹⁴

Tree protection. The tree protection standard prohibits the cutting of any disease free tree with a trunk diameter of eight inches or more, in conjunction with any development activity.

Also, before development can occur a tree survey of all trees of the applicable size and larger shall be made within the area to be developed. Surveys must be conducted by a landscape architect, engineer, or by a registered land surveyor.⁹⁵

Open Air Merchandising

The last provision to consider deals with open air merchandising. Open air merchandising on major thoroughfares shall be surrounded (except for entryways) by a buffer open space to include a screening wall of earthtone colors of at least six feet in height. An earthen

⁹⁴ Ibid., p. 225.

⁹⁵ Ibid.

berm or dense landscape planting creating a solid barrier are also acceptable. Open air merchandising areas include:

1. rental cars, trucks, trailers,
2. boats,
3. yard and farm implements,
4. seafood products,
5. pots, pans, quilts, blankets, and household goods,
6. salvage materials, building supplies, and equipment.⁹⁶

In theory, the major issue surrounding all provisions seems to be whether or not the benefits of such standards outweigh the cost of implementing such standards. To make such a determination is beyond the scope of this thesis. However, it should be pointed out that Hilton Head Island is a unique case, and as will be seen later, traditional economic/market theory does not apply.

Because Gardner Matthews Plantation is not required to be developed based on the adopted development standards, it is impossible to discern where they meet or exceed the standards. According to the developer, however, the fact that the plantation will not be developed by Island standards does not matter given that Gardner Matthews Plantation will be developed in accordance to standard architecture, landscape architecture, and engineering principles and practices as well as developed in response to market demands. The combination of these two factors, they contend, will make their developments more environmentally sensitive than if it were subjected to the development standards. They further point out that for over

⁹⁶Ibid., p. 223.

three decades they have been developing not only environmentally sensitive, but also highly marketable projects.

The architect and planner for Hilton Head also pointed out that a successful project is dependent on market appeal. In this instance, the market is a very sophisticated buyer who requires an environmentally sensitive plan and protection measures which safeguard their investment. They feel that if the Hilton Head Company process were not environmentally sensitive, they would soon go out of business. In addition, they feel that developing on a barrier island with high amenity appeal and focused on a resort/retirement market requires that an extreme sensitivity to the environment is required in their design process. So although the more detailed inventories were not conducted, their experience in development, requirements of the market, and company commitment to quality ensures an environmentally sensitive development plan. As one person put it, "we are in the business for the long haul and we cannot afford to mess it up--we have too much invested."⁹⁷

During the interviews with officials, they were asked to estimate the increased costs associated with the new development standards. In general, the respondents said it would not increase their cost because such standards were generally exceeded in order to create the unique environments required by the market for plantation developments on Hilton Head Island. However, two officials did indicate that there would be increased cost versus conventional

⁹⁷Interview with Bruce Black, March 1984.

developments. An architect estimated that the development standards would increase the cost 5 to 10 percent, versus conventional approaches. One utility official estimated that the underground wiring requirement increases the cost 50 percent. However, he contended that Hilton Head puts their utilities underground anyway.

In another interview, the official would not venture a cost estimate; however, he did say that cost is not the limiting factor. What the market will pay is the limitation and, as will be seen later, costs are well below revenues.

The Hilton Head Company did not conduct an extensive environmental analysis in developing the plan for the Gardner Matthews Plantation. The planning process was market based and the architects, engineers, and landscape architects were then assigned the task of providing an environmentally sensitive plan. Based on the previously described theories of what constitutes an environmentally sensitive planning process, the Gardner Matthews Plantation development planning process is inadequate. It lacks a systematic analysis of environmental features and processes. It lacks systematic procedures such as capability, suitability, and carrying capacity as a basis for decisions, and alternative plans were not selected based on environmental impact or even environmentally sensitive development standards.

In such an environmentally sensitive area, it is generally considered not a good idea to overlook the systematic protection of the features which create the unique appeal and market attraction presented by barrier islands. It may be decades before it can be

ascertained with any certainty whether or not this flaw in the planning process will lead to a deterioration in the overall environmental quality of the proposed plantation.

The natural environment, although important, is only one of the factors that must be considered when assessing development on Hilton Head Island. Economic and fiscal factors also need to be analyzed. The next chapter provides the basis for such an analysis by discussing economic, fiscal, and impact assessment theory.

CHAPTER IV

FISCAL AND ECONOMIC IMPACT ASSESSMENT APPROACHES

Impact Assessment

Impact assessment, including fiscal impact assessment, has been conducted for a number of years. Impact assessment reached its peak with the NEPA requirements for environmental impact statements and socioeconomic impact requirements. Early assessment methodologies usually confined their scope to positive and negative attributes of specific proposals and alternatives. However, such approaches supposedly lacked objectivity and were replaced by more quantitative (cost/revenue) impact assessment approaches. By the late 1970s, impact assessment methods were concerned not only with the effect of development on a community's fiscal structure but also with economic, social, and environmental effects because of the realization that land use decisions affect the quality of life of a community. The National Environmental Policy Act of 1969 and the inclusion of land use management programs in the model code of the American Law Institute helped to popularize the use and importance of impact assessment methodologies in the evaluation of land use decisions.¹

¹F. Stuart Chapin, Jr. and Edward J. Kaiser, Urban Land Use Planning (Urbana: University of Illinois Press, 1979), pp. 596-605.

Impact Assessment: Use and Importance

Impact assessment is a way by which federal, state, and local governments or private agencies can measure the impact of a proposed project or program on environmental, social, economic, cultural and fiscal factors. In the case of physical development proposals, it aids in making land use decisions and in the process assists communities in the management of their resources. Impact assessments can be used by a public body for the following purposes:

1. To compare actual impacts with the developers predicted impacts,
2. To use as an evaluation tool in determining the quality of local government decision making, by comparing actual to predicted impacts,
3. To provide a series of case histories that can aid in the analysis when comparable plans and projects need to be reviewed, and
4. To provide objective information regarding land use decisions.²

Impact Assessment Issues

Impact assessment studies can raise a variety of issues. The issues raised are generally either concerned with political/institutional problems or contextual problems. Contextual issues are concerned with the collective effects of development, spillover effects and secondary impacts. Issues that are political or

²Phillip S. Schaenman and Thomas Muller, Measuring Impacts of Land Development, An Initial Approach (Washington, D. C.: The Urban Institute, 1976), pp. 21-22.

institutional in nature deal with the problems of information overload, public/private conflicts, land use precedents and the additional costs (measured by time and money) in the decision making process.³

Collective Effects of Development

The Urban Institute recommends that the collective effects of development be considered when conducting an impact assessment. There are three major reasons the Urban Institute recommends that the collective effects be considered. First, the combined impacts of several developments may not have a simple additive effect on the surrounding community but instead may have a compounding effect on the economy, environment, and public services and facilities. For example, rapid urbanization or the development of several large projects within a short time span may create a need for a larger municipal staff (i.e., engineers, planners, police, and fire officials, etc.) or may create the need for the expansion of public facilities and services to accommodate the increased demand placed on those services by the new developments. The point is that the combined effect of several developments may be quite different from the effect of a single development.⁴

Second, the impacts of one development on an important community characteristic may be inconsequential, but the effects of all proposed developments on that same characteristic may be substantial.

³Ibid., p. 25.

⁴Ibid.

For instance, one development may not greatly effect the water supply of a community, but several large developments may withdraw more water from an aquifer than can be recharged and consequently create a significant cone of depression.⁵

The third reason for considering the collective effects of development is that the effects of some developments may offset the positive or negative effects of other developments. For example, the possible positive impacts of a community park may be offset by a proposed development located in the same area that generates a great deal of traffic, pollution, and noise.⁶

There are, however, certain drawbacks associated with considering the collective effects of development. The main drawback would be the complexity of such a task. Such collective studies are time consuming, costly, and cumbersome. Also, data on proposed developments, especially in a competitive market, are not readily available.

Spillover and Secondary Effects

The effects of large developments can reach far beyond jurisdictional boundaries. For example, a development may draw construction workers from neighboring counties and even neighboring states. Or water pollutants generated in a certain community may permeate and pollute a major aquifer that traverses several different states.

⁵Ibid., p. 26.

⁶Ibid.

The point is that many spillover effects have regional implications as well as local impacts.⁷

Spillover effects present a problem because they are hard to measure. The measurements of such effects are difficult because it is hard to isolate the primary cause and because such effects are generally diffuse in nature.

Secondary or indirect impacts are also generated by developments. The addition of residential, commercial, or industrial facilities to a community not only generates primary economic activity but also secondary economic activity. When new development activity brings immigration it then creates a demand for housing and consequently a demand for additional support facilities/personnel (i.e., shopping facilities, doctors, lawyers, etc.).⁸

Although the importance of indirect impacts of development is well established, determining, measuring, and predicting indirect impacts is a difficult task. Measuring secondary impacts also presents a problem in that there is the potential for double counting when differentiating primary and secondary impacts.⁹ Although collective, spillover, and secondary effects are important in a complete impact analysis, for purposes of this paper the focus will be on the primary fiscal and economic impacts of development.

⁷Ibid., p. 26.

⁸Ibid., pp. 26-27.

⁹Robert W. Burchell and David Listokin, The Fiscal Impact Handbook, Estimating Local Cost and Revenues of Land Development (New Brunswick, New Jersey: Rutgers Center for Urban Policy Research, 1978), p. 2.

Land Use Precedents

A land use decision regarding a proposed development may have a far greater impact in the future than the actual primary impacts on the community. Each land use decision sets a standard by which developers in the future base their investment and design decision. Consequently, once a land use decision is made and developers have made their development decisions based on a previous land use decision, then a political body must treat all developers equally. Equality implies that each developer has the same rights and privileges as those given to the developer in the previous land use situation. Potential precedent-setting situations usually involve a change in allowable density/intensity of development or development in a previously undeveloped area. An example of a possible precedent-setting situation would be allowing development on an undeveloped beach.¹⁰

Public/Private Conflicts

One major political problem associated with the use of impact assessments is that community conflicts can be created. Any assessment that uncovers problems previously unknown or provides subtenance to a previously noticed but neglected problem can create a considerable amount of community turmoil. For instance, a community fiscal loss associated with a proposed industrial development could intensify conflict between environmentalists and those who are concerned with

¹⁰Schaenman and Muller, p. 27.

economic growth and development. Thus, those who concur with the idea of broadening a community's economic base may not consider publishing such data in order to avoid conflict. Conversely, an impact assessment study could alleviate a community's development concerns. For example, concerns about pollution, fiscal deficits, or even residential displacement could be dispelled by an impact assessment.¹¹

Information Overload

An information overload can have the effect of overburdening or confusing decision makers, and thus slowing down the decision making process. Also, some decision makers are impressed by large amounts of quantitative data and never question the reliability, validity, or precision of that data. Consequently, land use decisions can be made on imprecise and inaccurate data. The point is that information presented in the proper context can be an extremely valuable asset to a decision making body; however, if presented out of context and buried in a large volume, it can also become a liability in the decision making process.¹²

Additional Costs to the Decision Making Process

Collecting the data for an impact assessment study is most likely to require additional staff, time, and money for a public

¹¹Ibid., pp. 27-28.

¹²Ibid., p. 28.

agency. A developer's costs might also be increased by requiring that they supply additional data. Eventually these additional costs are passed on to the consumer.¹³

Impact Assessment: An Overview of the Checklists Approach

The Impact Assessment Checklist, as proposed by the Urban Institute, is a systematic approach for measuring the effects of development on environmental, social, economic, and fiscal dimensions of a community. Impact categories and the measures for evaluating the impacts of land development on these categories are illustrated in Figure 3. The checklist in Figure 3 is comprised of five major impact dimensions and 48 categories. However, not all of the measures nor all of the impact categories would apply to a specific development. The measures and categories which are used vary from community to community depending on their particular goals, objectives, problems, and current issues.¹⁴

For most assessments, only a few measures are needed. Usually major developments with particularly large impacts, smaller developments whose impact is considered to be significant, and precedent-setting developments will be the subject of a more intense and detailed analysis.¹⁵

¹³Ibid.

¹⁴Ibid., p. 13.

¹⁵Ibid., p. 14.

Impact Area ¹	Measure	
<i>I. Local Economy</i>		
Public Fiscal Balance	1. Net change in government fiscal flow (revenues less operating expenditures and annualized capital expenditures).	proves or lessens the overall neighborhood attractiveness, pleasantness, and uniqueness. ⁴
Employment	2. Number of new long-term and short-term jobs provided.	Landmarks 16. Rarity and perceived importance of cultural, historic, or scientific landmarks to be lost or made inaccessible.
	3. Change in numbers and percent employed, unemployed, and underemployed.	
Wealth	4. Change in land values.	
<i>II. Natural Environment²</i>		
Air	5. Change in level of air pollutants and number of people at risk or bothered by air pollution.	
Water	6. Change in level of water pollutants, change in tolerable types of use, and number of persons affected, for each body of water.	
Noise	7. Change in noise and vibration levels, and number of people bothered by excessive noise and vibration.	
Greenery and Open Space	8. Amount and percent change in greenery and open space.	
Wildlife and Vegetation	9. Number and types of endangered or rare species that will be threatened.	
	10. Change in abundance and diversity of wildlife and vegetation in the development and community.	
Scarce Resource Consumption	11. Change in frequency, duration, and magnitude of shortages of critically scarce resources, and the number of persons affected.	
Natural Disasters	12. Change in number of people and value of property endangered by flooding, earthquakes, landslides, mudslides, and other natural disasters.	
<i>III. Aesthetics and Cultural Values³</i>		
Views	13. Number of people whose views are blocked, degraded, or improved.	
Attractiveness	14. Visual attractiveness of the development as rated by citizens and "experts."	
	15. Percent of citizens who think the development im-	
<i>IV. Public and Private Services</i>		
Drinking Water	17. Change in rate of water shortage incidents.	
	18. Change in indexes of drinking water quality and safety.	
Hospital Care	19. Change in number of citizens who are beyond x minutes travel time from a hospital emergency room (using such time as the community considers reasonable).	
	20. Change in average number of days of waiting time for hospital admittance for elective surgery.	
Crime Control	21. Change in rate of crimes in existing community or new development (or expert rating of change in hazard).	
	22. Change in percent of people feeling a lack of security from crime.	
Fire Protection	23. Change in fire incidence rates.	
	24. Change in rating of fire spread and rescue hazards.	
Recreation ⁵	25. Change in the number of people within—or beyond—a reasonable distance (x miles or y minutes) from recreational facilities, by type of facility.	
	26. Change in usage as a percent of capacity; waiting times; number of people turned away; facility space per resident; and citizen perceptions of crowdedness at recreational facilities.	
	27. Change in perceived pleasantness of recreational experience. ⁸	
Education ⁶	28. Change in number of students within x minutes walk or y minutes ride from school, by type of school.	
	29. Number and percent of students having to switch	

Figure 3. Measures for Evaluating the Impacts of Land Developments.

		schools or busing status (from walking to busing or vice versa).			are substandard, and change in number and percent of people living in such units.
	30.	Change in crowdedness "breakpoints" (such as need for added shifts) or indicators (such as student-teacher ratios); student, teacher, and parent perceptions of crowdedness and pleasantness of schooling.		40.	Change in number and percent of housing units by type (price or rent range, zoning category, owner-occupied and rental, etc.) relative to demand or to number of families in various income classes in the community.
Local Transportation ⁷	31.	Change in vehicular travel times between selected origins and destinations.	People Displaced	41.	Number of residents, or workers, displaced by development—and by whether they are satisfied with having to move.
	32.	Change in duration and severity of congestion.			
	33.	Change in likelihood of finding a satisfactory parking space within x distance from destination or resident.	Population Mix	42.	Change in the population distribution by age, income, religion, racial or ethnic group, occupational class, and household type.
	34.	Change in numbers and percent of residents with access to public transit within x feet of their residences; and numbers and percent of employees who can get within x distance of work location by public transit.	Crowdedness	43.	Change in percent of people who perceive their neighborhood as too crowded. ⁸
	35.	Change in the rate of traffic accidents (or expert rating of change in hazard presented).	Sociability-Friendliness	44.	Change in frequency of visits to friends among people in the existing neighborhood, and frequency of visits between people in the existing neighborhood and the new development.
	36.	Number and percent of citizens perceiving a change in neighborhood traffic hazard; and change in pedestrian usage of streets, sidewalks, and other outdoor space. ⁸		45.	Change in percent of people perceiving the neighborhood as friendly. ⁸
			Privacy	46.	Number and percent of people with change in "visual" or "auditory" privacy.
Shopping	37.	Change in number of stores and services, by type, available within x distance of y people.		47.	Number and percent of people perceiving a loss of privacy. ⁸
	38.	Change in the percent of people generally satisfied with local shopping conditions (access, variety, crowdedness). ⁸	Overall Contentment with Neighborhood	48.	Change in percent of people who perceive their community as a good place to live. ⁸
V. Housing and Social Conditions			Fairness to All Groups		The above measures should be considered with respect to specific clientele groups or population segments that are affected to reflect the quality of fairness in new developments.
Housing Adequacy	39.	Change in number and percent of housing units that			

Figure 3. Continued.

Source: Philip S. Schaenman and Thomas Muller, Measuring Impacts of Land Development, An Initial Approach, 1976.

There are five major impact dimensions which should be reviewed in an impact assessment. Those five dimensions are:

1. local economy,
2. natural environment,
3. aesthetics and cultural values,
4. public and private services,
5. housing and social conditions.¹⁶

Determining the impacts of development on the local economy is the major focus of this paper. When analyzing the local economy one must consider the effects of development on employment, housing, income, and fiscal structure.

Economic Impacts of Land Development:

A Causative Circular Relationship

The effect of development on a community's employment, housing, income, and fiscal structure is causative and circular, since all of the four components interrelate. Thus, a new development will have an effect on all four economic components. For example, a development that increases surrounding land values will also increase property tax revenues and consequently a community's fiscal flow. Furthermore, employment opportunities resulting from new development can increase the demand for housing and in turn affect the value of the existing housing stock and the amount and value of available developable land. In this case, property tax revenues would be affected, the demand for

¹⁶Ibid., pp. 10-11.

public services would increase, and the fiscal revenues of a community would also change as a result of new development. As a result of these component linkages, all four components must be viewed as one unit and treated in a comprehensive fashion.¹⁷ The following paragraphs will discuss in more detail the four components.

Employment

Two of the most important impacts associated with development are increased employment opportunities and the accompanying change in personal income. The importance of employment stems from the fact that 75 percent of all personal income is composed of wages and salaries. In general, the largest generators of employment opportunities are industrial and commercial facilities, with residential construction having a lesser impact on employment opportunities. It is important when assessing the impact of development on employment that one consider development's effect on short-term and long-term jobs and how development affects the unemployment rates.¹⁸

A commonly used measure of a development's impact on employment is the total number of jobs generated. This measure does not, however, reflect or measure a development's effect on the job possibilities for local citizens. Such a measure provides no information on whether or not jobs will be filled by local citizens or by

¹⁷Thomas Muller, Economic Impacts of Land Development: Employment, Housing, and Property Values (Washington, D. C.: The Urban Institute, 1976), pp. 1-10.

¹⁸Ibid., p. 9.

individuals from outside the community. Employment impact assessments can be made more relevant to the issue of local employment by collecting information and measuring the impact of development on local unemployment rates and the generation of long- and short-term jobs. The impact of development on the unemployment rate should be measured. However, even though the estimate is crude, it still provides a better employment picture than just an estimate of the total number of jobs created.¹⁹

Short-term employment. Short-term employment is defined as "those jobs which are not permanent at one site."²⁰ Generally, the largest effect of development on short-term employment is in the private sector. The construction trades usually benefit the most from a new development in the short-term. The majority of construction jobs are in the site preparation and the actual construction of the facility. In addition, workers are needed to construct roads and water, sewer, and drainage lines. Jobs for secretaries, planners, architects, and engineers may also be created. However, in most instances, "white collar" jobs are considered as long-term employment support.²¹

Estimates of the number of short-term employees, or person-years of employment, can be obtained from construction company records

¹⁹Ibid., p. 9 and p. 37.

²⁰Ibid., p. 16.

²¹Ibid., p. 20.

or by manipulating construction costs data. Wages can be obtained from regional data or construction company records.²² An example of manipulating construction costs data in order to obtain the number of construction jobs generated by a development is demonstrated in Table 8.²³

Short-term public sector employment. An increase in short-term public sector employment is usually not as significant nor as important as short-term private sector employment. Public sector employment is usually created as a result of public facility expansion. A large planned unit development or several smaller developments combined may require that a community expand its street system, school system, police and fire capabilities, or extend its water, sewer, or utility lines. As to whether or not a community expands its public facilities is based on its current facility capacity, the availability of public funds and the size of the new development. In general, data for estimating public employment is generated in the same fashion for short-term private employment.²⁴

Long-term jobs. Long-term jobs are defined as "those jobs which are permanent or semi-permanent at one site."²⁵ The majority

²²Ibid.

²³Ibid., p. 22.

²⁴Ibid., p. 23.

²⁵Ibid., p. 16.

Table 3. Conversion of Project Cost to Construction Labor Time

Item	Totals
Total Project Cost	\$7,000,000
Estimated Labor Share of Total Construction Cost	32%
Average Area Wage Per Hour ^{a/}	\$9.00
Number of Housing Units Constructed	170
Number of Construction Person-Years	
$\frac{\$7,000,000 \times 0.32}{\$9.00 \times 2,000 \text{ } ^{a/}} = \frac{2,240,000}{18,000} =$	124
Number of Person-Years Per Housing Unit	0.73

^{a/} = 40 hours x 50 weeks

Source: Thomas Muller, Economic Impacts of Land Development: Employment, Housing, and Property Values, 1976.

of long-term jobs created as a result of industrial, commercial, or residential developments are usually private sector jobs.²⁶ The extent of a development's impact on a community's employment base depends on the number of new jobs generated, skills of community residents, and the number of jobs filled by immigrants and individuals living outside of the community. It also depends on job transfers within the community, new entrants or those reentering the labor force, and the number of positions filled by those who are unemployed.²⁷

Employment data obtained directly from businesses or employment data from similar businesses may be used to estimate new long-term employment. Furthermore, ratios based on sales, payroll volume, and floor space may be used to estimate the possible total number of long-term jobs generated by a development. Regional data by industry is available for floor space per employee ratios. Salary structures, by commercial or industry sectors, are also available from published sources such as the U. S. Census. Secondary information sources may be inadequate, however, if new industrial and commercial facilities are more or less advanced or have higher or lower wages and employees per unit output ratios than published information sources.²⁸

²⁶Ibid., p. 25.

²⁷Ibid., p. 37.

²⁸Ibid., pp. 25-27.

Long-term public sector employment. Public sector employment and wage rates in the public sector have increased dramatically in the last three decades. In the mid-70's approximately 12 percent, or 8.5 million persons, were employed in the public sector. The majority of local public workers (60 percent) were employed by the local public school system.²⁹ The number of public employees varies significantly among communities and the impact of a development on a community will greatly depend on the development type and the market that the development captures. For example, a development designed for singles, young married couples, couples with children, or for "empty nesters" would vary substantially in its need for public services and facilities.

In general, employee-to-population ratios can be used as one method to determine the effect of new development on long-term public employment. For example, if a public school system maintains a ratio of one teacher to 30 students, then an increase in 90 students would require an additional three teachers.³⁰

Also, depending on the type of development, additional staff may be needed for other public agencies such as police, fire, recreation, sanitation, libraries, planning, community development, etc.

Housing

The extent of impact that a residential development has on an area's housing market depends on the community and the type of

²⁹Ibid., p. 32.

³⁰Ibid., pp. 32-33.

development. Usually, the demand for housing is stimulated by major employment generating facilities such as industrial or commercial developments. When employment opportunities increase, immigration occurs, personal income expands, and consequently, a demand for housing is generated. There are many positive as well as negative effects created as a result of new residential development. On the positive side, new housing construction can mean an increase in the supply of housing and an increase in the number of construction jobs. The major negative impacts associated with residential development are pollution (due to population and transportation increases), public facility/service capacity reductions, and negative fiscal cash flows.³¹

New developments need to be analyzed by a community to determine how a new development will impact:

1. housing choice,
2. housing for those who lack adequate housing,
3. the residential filtering process, and
4. public facilities and services.³²

However, it must be remembered that housing markets tend to transcend jurisdictional boundaries since many people live in one community and work in another. Consequently, this fact must be taken into account when analyzing housing supply and demand.

³¹Ibid., pp. 79-80.

³²Ibid., p. 80.

Wealth: As Determined by Changes in Land Values

New development generally has an effect on surrounding land values. These effects usually diminish as distance increases from the development. The extent of impact is affected by many variables. The more prominent variables are zoning ordinances and policies, juxtaposition to other existing developments, location of future development, accessibility, and the availability of public services and facilities.³³

There are many different ways to estimate the impact of a new development on adjacent property values. Two of the most frequently used methods are property comparison and the examination of properties assessment records. In the property comparison approach, sales data for similar property before and after the development are compared. The property assessment approach involves the examination of property assessment records before and after development to discover how local appraisers anticipated the impact of the development on surrounding property values. Public improvements (i.e., roads, sewers, parks, etc.) as a result of new development can have a greater effect on property values than the actual development.³⁴

Property value assessment approaches are simplistic at best. However, given the state of the art of property valuation, they are widely used. In any case, despite the limitations of the approaches,

³³Ibid., pp. 121-130.

³⁴Phillip S. Schaenman and Thomas Muller, p. 54.

an attempt should be made to determine those properties that benefit or suffer from a new development or public improvements and those properties that do not benefit or suffer.

Fiscal Impact Assessments

Fiscal impact analysis is defined as

a projection of the direct, current, public costs and revenues associated with residential or non-residential growth to the local jurisdiction(s) in which this growth is taking place.³⁵

In essence, a fiscal impact study is a cost/revenue analysis that provides an estimate as to whether or not a new development will produce enough revenues to pay for the public services that the new development will require. In much of the literature, as in this paper, the cost/revenue and fiscal impact terms are used interchangeably.

The Rutgers University Center for Urban Policy Research describes six basic methods used in the analysis of fiscal impacts. These methods are: per capita multiplier, service standard, proportional valuation, case study, comparable city, and employment anticipation.³⁶

Both the average cost and marginal cost techniques can be used to determine the public services cost of development. The techniques differ in that average costing assumes growth to be linear.

³⁵ Burchell and Listokin, p. 1.

³⁶ Ibid., p. 4.

Growth is assumed to be cyclical by marginal costing techniques. The choice of one approach or the other depends on the data availability and philosophical/theoretical perceptions as to which approaches will best reflect community characteristics.³⁷

Methods for determining community revenue from new development are the same no matter what cost estimation technique is used. Multiplier or ratio methods are used to determine the many sources of service related income which are accrued as a result of various types of development. In general, the basic sources of local income are derived from standard sources such as property tax, sales tax, income tax, fees for public services, and intergovernmental transfers. Determining local revenue, however, is becoming more complicated because of the increasing diversification of revenue sources. Despite the diversification of revenue sources, the property tax remains the major source of tax revenues for municipalities.³⁸

Per Capita Multiplier Method. The Per Capita Multiplier Method is the most widely used fiscal impact analysis method. This method is based on an average cost that includes municipal cost per capita, and cost per student. Person and pupil estimates are based on housing types.³⁹ The per capita method begins by determining the municipal costs attributable to nonresidential uses. The method then

³⁷Ibid.

³⁸Ibid., p. 7.

³⁹Ibid., p. 5.

establishes municipal costs per person and school district costs per pupil. The costs assigned to a new development are determined by multiplying the per pupil and per capita municipal costs by the estimated population increase resulting from the development.⁴⁰

Burchell provides an example of the per capita approach:

A midwestern municipality is attempting to analyze the local fiscal impact of 100 garden apartments (80% - one bedroom; 20% - two bedroom). Units in the proposed development will rent for an average of \$250 and \$300 monthly and are estimated to be valued at \$15,000 and \$21,000 per unit, respectively. Demographic profiles of garden apartments for the area indicate that an average 1.686 residents and 0.036 school-age children may be expected to reside in one bedroom units and 2.685 residents and 0.232 school-age children in two bedroom units. Information obtained from the city manager and superintendent of schools tabulates current total municipal operating costs per person at \$250 annually and total school district costs per pupil at \$1,500 annually. The development is assigned \$33,720 (80 units x 1.686 persons per unit x \$250 per person) in municipal costs and \$4,320 (80 units x 0.036 children per unit x \$1,500 per child) in school district costs for the local fiscal impact of one bedroom units, and \$13,425 in municipal cost (20 x 2.685 x \$250), and \$6,960 in school district costs (20 x 0.232 x \$1,500) for two-bedroom units. The total cost to the municipality and school district for operations and capital additions for the 100 unit garden apartment development is thus estimated at approximately \$58,000 annually (\$33,720 + \$4,320 + \$13,425 + \$6,960).⁴¹

The method is appropriately used in situations where there is an approximate equilibrium between the supply of public services and the demand for these public services. The technique is also good for communities between 10,000 and 50,000 residents experiencing

⁴⁰Ibid., p. 26.

⁴¹Ibid.

slow to moderate growth. A major assumption with this technique is that the average cost of providing existing services will also be a reliable estimate of future service costs.⁴² In times of high inflation or high interest, such approaches traditionally underestimate future costs. Also where marginal costs are high or large increments are involved, such techniques tend to yield conservative estimates of future costs.

The per capita multiplier method is not appropriate for situations in which a locality has a significant excess service capacity or a significant deficient service capacity. A per capita multiplier technique applied in these two situations, because of its average cost assumption, will either underestimate or overestimate the fiscal impact of a development on the service structure of a community.

Case Study Method. The Case Study Method is used for both residential and non-residential development analysis. The size of a city has no effect on the technique's suitability as a fiscal impact analysis method. However, the case study method is usually applied to cities that demonstrate a significant overutilization or underutilization of its service capacity. Cities in such situations are usually large, stable or declining, or in rapidly growing metropolitan fringe areas.⁴³ The case study method can also be applied

⁴²Ibid., p. 27.

⁴³Ibid., p. 16.

to facilities that require special service considerations or large non-residential developments where average costing techniques do not work well.⁴⁴

The Case Study Method determines present and future public costs through interviews with community officials. The assumption is that department heads can provide accurate estimates of future service demand, extensions, and costs, based on their knowledge of existing conditions.⁴⁵

Service Standard Method. The Service Standard Method, just as the per capita multiplier method, is best suited to moderately growing suburbs or cities. However, the service standard method provides more detailed estimates of the service/facility, equipment, and labor costs associated with population change and increase. This technique is especially applicable to communities where only gross approximations of future facility/service demand exist and in communities that are susceptible to economies of scale and where geographical and quantitative differences in the provisions of public services exist.⁴⁶

Comparable City Method. The Comparable City Method is similar to the case study method in that it is used in situations where a community has an underutilized or overutilized service system capacity and where there are other comparable cities with similar population

⁴⁴Ibid., p. 18.

⁴⁵Ibid., p. 45.

⁴⁶Ibid., pp. 18-19.

characteristics and growth experiences that can add to the understanding of the relationship between system capacity and cost/revenue impact projections. The method is based on expenditure ratios that are determined by community population and growth rates. The comparable city method is sensitive to economies and diseconomies of scale as well as variations in community expenditures.⁴⁷

The Proportional Valuation Method. The Proportional Valuation Method is used when analyzing non-residential facilities. It is applied to significant employment-generating developments, usually commercial or industrial, that have standardized employee to square foot ratios. A major assumption of this approach is that public costs associated with a specific development are proportional to the development's share of local property value.

The method tends to underestimate public costs for small developments and overestimate public costs for larger developments. However, it is the method's sensitivity to economies of scale and its ease of applicability that make it a useful technique.⁴⁸

Employment Anticipation Method. The Employment Anticipation Method is used for analyzing non-residential facilities. It is usually applied to facilities having either an excessive or a deficient number of employees per square foot of non-residential space.

⁴⁷Ibid., p. 19.

⁴⁸Ibid., p. 20.

The method relies on regression coefficients to estimate public service cost. The costs are determined by the additional number of employees added to a community's service area.

The employment anticipation method is a quick and inexpensive method to use and is sensitive to the dimension of scale.⁴⁹

Fiscal Impact Computer Models

Computer models are an increasingly important method of fiscal impact analysis. In the long run, computer models simplify community impact assessment tasks. Two advantages associated with most computerized fiscal impact approaches are their ability to consider the fiscal effects of prior developments and their ability to consider the impact of numerous development proposals concurrently.⁵⁰

The following paragraphs provide a brief description of the Municipal Impact Evaluation System (MUNIES) and Provincial Municipal Simulator (PROMUS), two of the more advanced computerized fiscal impact models.

Municipal Impact Evaluation System (MUNIES). MUNIES was developed by Westinghouse and Marcou, O'Leary and Associates of Washington, D. C. in 1973. The system is currently being used by the Baltimore Regional COG, Southeast Idaho COG, Atlanta, and San Diego. MUNIES was developed to aid municipalities in the evaluation

⁴⁹Ibid.

⁵⁰Ibid., p. 345.

of fiscal impacts for both specific developments and alternative growth strategies. The system determines or evaluates the fiscal impacts of proposed developments by measuring the demand for public services (needs analysis) and by conducting a fiscal analysis, which determines the effects of accommodating such demands on a city budget. Demographic data and service standards are used to determine future service demand and the cost of satisfying such service demands.⁵¹ Data on the number of school age children and household size are derived from census data and local information sources to estimate future demand for public services. The cost per unit of service and future level of supply are determined by existing local per capita and per pupil service standards.⁵²

Provincial Municipal Simulator (PROMUS). PROMUS was developed by Decisions Sciences Corporation of Jenkintown, Pennsylvania for the City of Toronto in 1971-73. PROMUS has been applied in both Detroit and Philadelphia. PROMUS is one of the more complicated fiscal impact computer models. The model is based on a system's dynamics framework which uses arithmetic and regression approaches to analyze the fiscal impacts of development. The model's purpose is to simulate community characteristics through three sub-models.

The small area sub-model takes into account community population and employment distributions. The neighborhood sub-model

⁵¹Ibid., p. 347.

⁵²Ibid., p. 350.

considers each individual neighborhood of a community and then determines future social and economic neighborhood characteristics. The population and income sub-model estimates small area age and income distributions. The three sub-models are the basic components of the community model sub-system (CMS).

CMS is used as a basis for the Financial Policy Planning Sub-System (FPPS). FPPS is used in forecasting expenditure patterns and budget requirements for various public facilities and services based on community growth. FPPS is the analysis sub-system that determines the costs, cash flows, and revenues generated by community programs/facilities and proposed developments.⁵³

Both PROMUS and MUNIES are based on a per capita method. Furthermore, approximately two-thirds of the fiscal impact analysis surveys by Burchell and Listokin used the per capita method.⁵⁴ Thus, the validity of the use of this method is well established. Consequently, the per capita method is used extensively in the cost and revenue calculations of Chapter Four. That chapter begins with a discussion of the cost factors assessment method used to analyze the economic and fiscal impacts of the development of Gardner Matthews Plantation on Hilton Head Island.

⁵³Ibid., p. 351.

⁵⁴Ibid., p. 5.

CHAPTER V

THE COSTS AND REVENUES GENERATED BY THE DEVELOPMENT OF THE GARDNER MATTHEWS PLANTATION

A Costs Factors Assessment Method for Hilton Head Island

The costs factors assessment method proposed for Hilton Head Island consists of several techniques. The use of one technique rather than another technique depends on data availability and the type of cost, private or public. There is a difference between the methods used to determine private costs and public costs. For instance, the private development costs of Gardner Matthews Plantation are derived from preliminary estimates that were provided by the Hilton Head Company. Consequently, no data manipulation was necessary to determine private costs. In contrast, public costs are determined by using a per capita multiplier technique, multiplier technique, and by duplicating data. Furthermore, cost factors are not analyzed without also analyzing revenue sources. Thus, methods of revenue analysis are also included in the discussion of the cost factors assessment method.

The private costs and revenues of the development are divided into two categories: (1) costs and revenues inside Gardner Matthews Plantation, and (2) costs and revenues outside Gardner Matthews Plantation. The inside plantation boundaries include the residential and commercial land west of the powerline easement, excluding all parcels

accessed directly from Marshland Road. Also excluded are the multi-family and commercial parcels located in the southwest corner of Gardner Matthews Plantation. The land located east of the powerline easement but southwest of U. S. 278 is considered to be outside of the plantation. The land northeast of U. S. 278 (Northridge) is also beyond the plantation boundaries (see Pocket). The major distinction between the two categories is that the majority of development inside the plantation boundaries is composed of residential development, while the majority of development outside of the plantation is composed of commercial retail and commercial office development. However, in the analysis section of this chapter, all land whether inside or outside plantation boundaries is considered to be part of Gardner Matthews Plantation.

The costs attributable to development within or inside plantation boundaries consist of "finished lot construction costs." Finished lot construction includes development costs that proceeded the construction of residential and commercial structures. The cost items included within such development are:

1. roads and bridges,
2. utilities,
3. recreation facilities,
4. administration facilities,
5. security facilities and landscaping,
6. lagoon excavation,
7. planning and engineering,
8. miscellaneous non-budget items.

During a plantation's development, the Hilton Head Company will construct major and minor collector roads, local roads, bridges, box culverts and where necessary, overpasses. Also, constructed by the Hilton Head Company are water, sewer, and electrical utility lines and facilities. Such facilities include an interim waste treatment plant, collection mains, major and minor lift stations and a force main. Finished lot construction also includes: streetscaping, lighting, signage, maintenance building and equipment. Recreation facilities consist of a main clubhouse complex, golf courses, racquet club, and a yacht club. Other costs associated with recreation facilities development are docks, a dry storage facility, harbor excavation, harbor bulk heading, and a harbor lock and spillway. The administration facility is composed of a real estate sales office and a central operations center. The security facilities consist of gatehouses located at points of ingress and egress located within plantation boundaries.

Private revenues are also divided into outside plantation revenues and inside plantation revenues. Inside plantation revenues are generated by single family detached lot sales, multi-family unit sales and marina commercial area sales. Outside plantation revenues are generated by multi-family unit sales, commercial/industrial land sales, Town Center land tract sales, and Northridge land sales.

Public costs and revenues are not as easy to determine as the private costs and revenues. In general, three techniques are used to determine public costs:

1. per capita multiplier,
2. multiplier, and
3. data duplication.

Public revenues are determined by a combination of a proportional evaluation technique and a multiplier technique.

The per capita multiplier method uses demographic information and the average cost per person of operating expenses to determine costs attributable to new development.¹ A per capita figure is derived by dividing total operating expenses by a demographic variable, usually the total population of the area, or the total number of residents served by a particular public service. The per capita figure is then multiplied by the estimated population increase to determine total costs.

The multiplier technique uses a mathematical function (multiplication) to determine total cost. In essence, two variables are multiplied together to come up with a total cost figure. For example, the total water consumption of a development multiplied by cost per gallon of water to upgrade an existing pumping facility equals the total cost of facility improvement attributable to growth.

Data duplication is the transference of data from one source/publication to an other. Consequently, no data manipulation is necessary to determine an item cost or total cost.

¹Robert W. Burchell and David Listokin, The Fiscal Impact Handbook Estimating Local Costs and Revenues of Land Development (New Brunswick, New Jersey: Rutgers Center for Urban Policy Research, 1978), p. 25.

There is only one exception to the three previously described methods that are used to determine public costs. The per capita multiplier technique used to determine general governmental costs is more complex. It is more complex in that additional information is considered and more calculations are made before a total cost value is determined.

In this case, the per capita multiplier method used is a seven step process to determine total cost. Those seven steps are:

1. obtain total annual municipal expenses,
2. assign a share of annual municipal expenditures to existing non-residential uses,
3. calculate net annual per capita expenditures,
4. calculate anticipated total residential population,
5. calculate residentially induced total annual municipal expenses,
6. calculate municipal costs for inclusive non-residential uses, and
7. determine total annual public costs.²

The major difference between the initial per capita approach and the latter approach is the separation of non-residential and residential costs attributable to new development. Other than that distinction, the two per capita methodologies are the same.

The proportional evaluation technique is used in instances when certain budget item costs cannot be estimated or projected. For

²Ibid., pp. 28-29.

example, given available information, it is not possible to determine increases in state shared funds given the development of Gardner Matthews Plantation. Items listed under the category of state shared funds include: bank tax, beer and wine tax, alcoholic beverage tax, insurance tax, and a motor transport tax. Thus, in order to estimate the effect of development on such revenue items, a proportional evaluation technique was applied.

Basically, the technique algebraically manipulates two variables, one known and one unknown. First, item revenues listed in a budget must have their percent of total revenues determined. Next, the percentages of those budget items for which revenue estimations are possible (i.e., property tax) must be combined into a percentage of total budget revenues. It is then a matter of estimating the revenue increases for those items as a result of new development. Once the budget item's percentage of total existing revenues is known and the estimated revenues generated by those items is also known, it is then just a matter of algebraically determining the revenues that will be generated by the unknown proportion. For example, in the Beaufort County School District, revenues generated from property taxes amount to 56 percent of the total school district revenues generated. All other revenue items generate 44 percent of the total school district revenues. School district property tax revenues, due to the development of Gardner Matthews Plantation, will increase by \$10,000. Thus, \$10,000 or 56 percent, of the estimated future revenues generated by the non-development is known. Now the revenues

generated by the unknown proportion or percent (44) of the budget items must be determined. The estimated "unknown" revenues are determined by dividing 10,000 by 56 and then by multiplying the resulting quotient by 44, the unknown proportion. The algebraic equation and the actual mathematical manipulations are as follows:

$$\text{Step 1: } 56x = \$10,000$$

$$\text{Step 2: } \frac{56x}{56} = \frac{\$10,000}{56}$$

$$\text{Step 3: } 1x = \frac{\$10,000}{56} = 178.5$$

$$\text{Step 4: } 178.5 \times 44 = \$7,757$$

Based on the above calculations, the development of Gardner Matthews Plantation would increase state, federal, and other school district source funds by \$7,857.

The use of one cost or revenue method instead of another usually depends on what information is available. In some situations the data dictated that more than one of the described methods was used to determine or estimate both costs and revenues.

Private Costs/Revenues--Gardner Matthews Plantation

The costs and revenues associated with the development of Gardner Matthews Plantation to the Hilton Head Company are derived from a company budget. Costs and revenues are calculated over a 16-year period, from 1983 to 1999, and are listed by major item. Private cost and revenue data are also separated into inside plantation and outside plantation categories. However, all cost and

revenue data for this study are totaled to provide one overall cost and revenue figure. It is important to note that the listed costs/revenues for Gardner Matthews Plantation do not include private cost and revenue for Northridge. Data on Northridge is not available because of its stage of development and general sensitivity of such data. Table 9 lists the private costs/revenues of Gardner Matthews Plantation for both inside and outside plantation categories.

Revenues generated by the development of Gardner Matthews Plantation are also divided into inside plantation and outside plantation categories. Revenues are also projected over a 16-year time period. Inside plantation revenues are based on single family detached lot sales, multi-family unit sales and commercial area sales. The price of single family lots as well as multi-family units varies depending on the location of a particular lot or unit. There are three types of single family detached lots: (1) estate lots, (2) single family lots, and (3) patio lots. The estate lots are approximately one acre in size. The single family lots are 115' x 175', or approximately one-half acre, and the patio lots are generally smaller than the single family lots and have a zero lot line. In addition, the prices of lots vary within their own classification. The lot prices vary depending on their closeness to a recreation amenity and on the type of recreation amenity. Table 10 lists each type of single-family detached lot by price.

The land prices of multi-family units also vary with locations. There are 11 multi-family unit locations; the unit locations and their prices are listed in Table 11.

Table 9. Preliminary Cost Estimates for Gardner Matthews Plantation:
Inside Plantation and Outside Plantation Costs.

Cost Item	Cost (Dollars)
<u>Inside Plantation</u>	
Roads and Bridges	\$ 8,678,274
Utilities	10,167,087
Recreation Facilities	16,393,478
Administration Facility	562,769*
Security Facilities and Entrance Landscaping	274,512
Lagoon Excavation	3,961,162
Planning and Engineering	4,425,665
Miscellaneous Non-Budget	<u>4,023,332</u>
Total Inside Plantation Development Costs	\$48,486,280
<u>Outside Plantation</u>	
Roads and Bridges	\$ 1,458,834
Utilities	2,552,826
Administration Facility	187,590*
Lagoon Excavation	853,895
Planning and Engineering	633,835
Miscellaneous Non-Budget Items	<u>576,213</u>
Total Outside Plantation Development Costs	\$ 6,263,193
Overall Total Cost of Gardner Matthews Plantation	\$54,749,473

* Costs for items shared by both inside plantation and outside plantation areas are pro-rated on the basis of 3/4 being allocated to inside plantation and 1/4 to outside plantation costs.

Table 10. Single Family Detached Lots by Type and Typical Prices.

Type	Price (Dollars)
<u>Estate Lots (Approximately One Acre)</u>	
Golf Front Lots	\$145,000
Lagoon Front Lots	90,000
Interior Lots	60,000
<u>Single Family Lots (115' x 175')</u>	
Golf Front Lots	62,500
Lagoon Front Lots	50,000
Nature Preserve Lots	45,000
Interior Lots	35,000
<u>Patio Lots (Zero Lot Line)</u>	
Golf Front Lots	40,000
Lagoon Front Lots	37,500
Nature Preserve Lots	35,000
Interior Lots	25,000

Table 11. Multi-Family Unit Locations and Land Prices.

Multi-Family Locations	Price (Dollars)
Harborside	\$40,000
Marsh/Harborside	50,000
Harbor Village	17,000
Marsh Harbor	22,500
West Marsh	22,500
Golf/Lagoon	20,000
Lagoon Front	13,500
Lagoon Front	15,000
Cluster Houses	22,500
Golf Club Villas	25,000
Golf Club V.I.P. Villas	40,000

Total gross revenues are based on the number and type of single family detached lots and multi-family unit sales and total inside plantation residential revenues. Table 12 lists inside plantation revenues based on residential lot and unit type. Total inside plantation non-residential revenue is also included in Table 12.

Revenues generated from outside plantation development are based on both residential and non-residential sales. Residential revenues are derived from the sale of multi-family units. Here again, land price per unit varies with unit location.

Multi-family unit land prices are as follows:

Marsh Front--\$15,000

Lagoon Front--\$12,000

Lagoon Front--\$12,500

Interior--\$7,500

Table 12. Inside Plantation Residential and Non-Residential Revenues.

Lot/Unit Type	Revenues (Dollars)
Estate Lots	3,796,421
Single Family Lots	73,930,916
Patio Lots	17,520,354
Multi-Family Units	210,501,053
Total Inside Plantation Residential Revenues	305,748,744
Total Non-Residential Revenues (Marina Commercial Area)	2,749,533
Total Gross Revenues	308,498,288

According to the Hilton Head Company, the total off-plantation multi-family revenues are estimated to be \$24,868,483.

The anticipated non-residential revenues will be generated from the sale of the commercial/industrial tract and the Town Center tracts. The commercial/industrial tract is located off of Marshland Road, while the Town Center tracts are located along U. S. 278 (see Pocket). The revenues generated by the sales of said tracts are listed below:

Commercial/Industrial:	\$ 2,530,150
Town Center Tracts:	\$ 9,910,922
Total Non-Residential Revenues:	\$12,441,072

The Hilton Head Company estimates that the gross revenues generated from the off-plantation development will amount to \$37,309,555. The total gross revenues, both inside and outside plantation revenues, generated by the development of Gardner Matthews Plantation is estimated

by the Hilton Head Company to be \$45,807,843. The overall total cost to develop Gardner Matthews is \$54,749,473. Plantation revenues exceed plantation costs by \$291,058,370.³

There are costs associated with the development of Gardner Matthews Plantation that are not reflected or included in the total cost figure. These costs are:

1. the cost of holding land,
2. opportunity costs,
3. the cost of overhead, and
4. the cost of capital.

These items represent critical and important cost factors. Unfortunately, cost data for those items are not readily available for analysis. However, these cost factors should be considered and incorporated into an indepth analysis.

Public Costs/Revenues--Gardner Matthews Plantation

There are five public agencies that will be affected by the development of Gardner Matthews Plantation. These five public agencies are:

1. Hilton Head Island Fire District,
2. Hilton Head #1 Public Service District,
3. Palmetto Electric Cooperative, Inc.,
4. Hilton Head General Government,
5. Beaufort County Schools.

³The Hilton Head Company, "Gardner Matthews Plantation Preliminary Cost/Sales/Cash Flow Analysis," Hilton Head Island, South Carolina, December 19, 1983.

Costs/revenues--Hilton Head Island Fire District. Gardner

Matthews Plantation is serviced by the Hilton Head Island Fire Department. That department is responsible for protecting 72 percent of Hilton Head Island, as well as 50 percent of the 1983 population or 6,398 people. The department employs 71 line and staff personnel.⁴

Increasing development activity in the Hilton Head Island Fire District has made it necessary for that district's fire department to expand the number of stations and personnel. The future development of Gardner Matthews Plantation and the beginning of commercial development in Hilton Head Plantation are the major reasons for the facility, equipment and personnel expansions.

The costs of increasing fire protection service due to the development of Gardner Matthews Plantation will be determined by using a per capita multiplier method. A per capita method was selected over an area coverage method given that the use of equipment and personnel is universal and not limited to one discrete service area or plantation. Thus, no proportional allocation of equipment/personnel based on area coverage or utilization within an area is justifiable.

The cost per district resident for the 1983-84 budget year is multiplied by the anticipated future number of residents who will reside in Gardner Matthews Plantation to determine the fire service cost to the Hilton Head Island Fire District. It is estimated that

⁴Joe Best, "Hilton Head Island Fire District Master Plan (Phased)," Hilton Head Island, South Carolina, 1983, p. 6.

by 1999 the population of Gardner Matthews Plantation will be 13,475 people (see Appendix A.1). At a per capita fire protection/service cost of \$140.00, the service cost would amount to \$1,886,500 (see Appendix A.2). Based on a percentage of the total assessed value of Gardner Matthews Plantation, residential properties will account for 89 percent (\$1,678,985) of the total costs. Commercial properties will account for 4 percent (\$207,515) of the total costs.

The Hilton Head Island Fire District is funded from Beaufort County property tax revenues. The property tax levy is based on a millage (mill) rate. A mill is one dollar per \$1,000 of assessed value. County Council and the County Auditor determine the annual millage rate. The millage rate to be levied is determined by dividing the amount of revenue needed to fund the annual budget by the total assessed value.⁵ The fire department can expend or use up to 21 mills a year.⁶ Gardner Matthews Plantation is assessed at \$52,501,218. Based on a tax levy of .021 mills, the Hilton Head Fire Department would receive \$1,102,526 in property taxes from the development of Gardner Matthews Plantation (see Appendix A.3). Fire district costs attributable by Gardner Matthews Plantation exceed fire district revenues generated by Gardner Matthews Plantation by \$783,974.

⁵Interview with Ed Gay, Beaufort County Tax Assessor's Office, Beaufort, South Carolina, March 1984.

⁶Interview with Joe Best, Hilton Head Island Fire District, Hilton Head Island, South Carolina, March 1984.

The per capita fire protection/service cost of \$140 may be a high per capita estimate for future years. The Hilton Head Fire District, given recent equipment, facility, and personnel expansions, is in a position to serve current properties as well as any future development within the fire district for approximately 15 to 20 years without any major apparatus or equipment purchases. Consequently, the per capita fire service value of \$140 may be somewhat lower in years to come. This may or may not occur because the fire department bases its millage rate proportionately to future estimated costs. If a 17 mill levy is adequate enough to meet anticipated expenditures, then the fire district will only levy 17 mills and not the maximum 21 mills.⁷

Cost/revenues--Hilton Head #1 Public Service District. Gardner Matthews Plantation will receive water and sewer service from Hilton Head #1 Public Service District. It encompasses a large portion of the remaining developable land on Hilton Head Island, which is in excess of 7,000 acres.⁸

The costs of the development of Gardner Matthews Plantation to Hilton Head #1 Public Service District can be grouped into two categories, operational costs and capital costs. The major capital costs can be attributed to a treatment plant capacity expansion, a reclaimed water distribution system, the Port Royal Sound backup system, and the

⁷Ibid.

⁸County Council of Beaufort County, South Carolina, "Summary of Hilton Head Island Four-Zone Sanitary Sewage Treatment Plan," 1983.

waste water transport system.⁹ The facility expansions and the upgrading of the existing wastewater system is the result of increasing development within the district, both present and future, and because of the inadequacy of the public service district to handle waste water flows during adverse or extreme conditions (i.e., peak tourist conditions combined with inclement weather conditions). The capital costs items do not include the costs of sewer/water lines or treatment/pumping facilities located in Gardner Matthews Plantation. Those costs are excluded given the fact that the Hilton Head Company provides all water/sewer lines and constructs any needed treatment or pumping facilities for Gardner Matthews Plantation. Gardner Matthews' proportionate cost of the treatment plant capacity upgrading, the wastewater transport system, the reclaimed water system, and the ocean outfall is approximately \$3,957,920. The wastewater transport system, reclaimed water system, and the ocean outfall amounts to \$1,281,920 of the total cost.¹⁰ The treatment plant capacity upgrading accounts for the other \$2,676,000 of the total cost. Gardner Matthews Plantation's proportion of the treatment plant capacity cost was determined by multiplying the upgrade cost per gallon of waste water (\$2.23/gallon) by the amount of waste water to be used by Gardner Matthews Plantation (1,200,000 gallons a day).

⁹Interview with Joe Pitts, Hilton Head #1 Public Service District, Hilton Head Island, South Carolina, March 1984.

¹⁰B. P. Barber & Associates, "Hilton Head Island Plan for Wastewater Collection, Treatment, Reuse and Disposal--Zone 3," Prepared for Hilton Head #1 PSD, Hilton Head Island, South Carolina, June 1983, p. 3.

The cost of providing water to Gardner Matthews Plantation is based on a plant facility upgrading cost of 90¢ per gallon of water. Gardner Matthews Plantation will draw 2.2 million gallons of water a day.¹¹ The cost of upgrading and expanding the water system of the existing plant facility is \$1,980,000.

The operating cost for the Hilton Head #1 Public Service District is determined by a per capita multiplier method. Hilton Head #1 Public Service District operating costs for 1983-84 are \$595,020. The public service district serves approximately 2,500 people.¹² The public service districts' operating cost is \$238 per capita. The estimated population of Gardner Matthews Plantation is 13,475 people. At a per capita cost of \$238, Gardner Matthews Plantation will attribute \$3,207,157 in cost to Hilton Head #1 Public Service District's operating budget. The total cost to Hilton Head #1 Public Service District, given the development of Gardner Matthews Plantation, amounts to \$9,145,077.

Hilton Head #1 Public Service District plans to construct the necessary sewer system, treatment system, and outfall from initial capital investments by developers and by developer user fees. Other possible capital investment sources are aid to construction fees, availability charges, general obligation bonds, and revenue bonds.¹³

¹¹Joe Pitts (Interview).

¹²Ibid.

¹³Ibid.

An "aid to construction fee" is a fee, paid by the developer, that is based on an estimate of the amount of water usage and waste water generated by a proposed development.

In general, operating revenue sources for Hilton Head #1 Public Service District are tap fees, water/sewer charges, and fees generated from repairs (other charges). Major non-operating revenue sources are property taxes, aid to construction fees, and availability charges.¹⁴

Revenue dollars generated by Gardner Matthews Plantation are derived by using a per capita multiplier method and a multiplier technique. Table 13 lists by item the total revenues generated by Gardner Matthews Plantation to Hilton Head #1 Public Service District. Calculations and source information are located in Appendix A-4.

The 2.2 million gallons of water a day may be a high estimate. The manager (Joe Pitts) of Hilton Head #1 Public Service District does not feel that Gardner Matthews Plantation will use that much water a day. However, the Hilton Head Company did request that 2.2 million gallons a day capacity be made available.

The total revenues to Hilton Head #1 Public Service District amounts to \$30,347,287. Total costs amount to \$9,145,077. Revenues to Hilton Head #1 Public Service District exceed costs by \$21,202,210.

Costs/revenues--Palmetto Electric Cooperative, Inc. Palmetto Electric Cooperative is a non-profit organization that provides Hilton Head Island with its electricity. Unfortunately, no complete

¹⁴Ibid.

Table 13. Revenues Generated by Gardner Matthews Plantation to the Hilton Head #1 Public Service District by Source.

Source	Dollars
Aid to Construction Fees	\$ 9,708,242
Property Taxes (1.2 mills)	63,001
Water Services (2.2 million gallons/day*)	20,074,885
Sewer Services (1.2 million gallons/day*)	350,401
Tap-in Fees	107,800
Miscellaneous	42,958
Total	\$30,347,287

* Usage and discharge data obtained from Joe Pitts, the Manager of Hilton Head #1 Public Service District, provide no reasons for the water service/sewer service disparity.

cost/revenue analysis for Palmetto Electric can be conducted. Public costs of the cooperative cannot be ascertained since the cooperative would not provide any data. However, revenues based on the provision of underground power to Gardner Matthews Plantation can be determined.

The revenues generated to the cooperative based on the provisions of underground power is \$4,583,182. Consequently, the total revenues generated to the cooperative by the development of Gardner Matthews Plantation equals \$4,583,182.¹⁵ The above revenues do not include revenues from rate or facility charges.

Costs/revenues--Beaufort County Schools. Beaufort County provides all public school services to Hilton Head Island. The cost

¹⁵ Hilton Head Company, "Gardner Matthews Plantation Preliminary Cost/Sales/Cash Flow Analysis," December 19, 1983.

of providing services to the Gardner Matthews development are determined by a per capita multiplier method. The cost of providing school service to Gardner Matthews Plantation is determined by multiplying the anticipated number of public students created by the development by the per pupil cost for school district services. The annual per pupil cost for school district services is \$2,061.09.¹⁶ There will be an estimated 1,210 students generated by the development of Gardner Matthews Plantation (see Appendix A.5). Thus, the school district expense, given the development of the plantation, is \$2,493,919.

Revenues generated by the development of Gardner Matthews Plantation to the Beaufort County School District are determined by a multiplier method and by a proportional evaluation method. The multiplier method is used to calculate property tax revenues. The proportional evaluation method is used to estimate revenues from local, state, and federal revenue sources.

The property tax revenues generated to the Beaufort County School District given the future development of Gardner Matthews Plantation amounts to \$2,577,809. Property tax revenues are based on a Gardner Matthews Plantation 1983 assessed value of \$52,501,218 multiplied by a 1983 school tax levy of 49.1 (.0491 mills).

In order to calculate the revenues from various local, state, and federal sources, a proportional evaluation method was applied. The method used and the actual calculations are shown in Appendix A.5C.

¹⁶ Interview with Ed Gaither, Beaufort County School District, Beaufort, South Carolina, March 1984.

Revenues from the above sources are labeled as "other source revenues."

The "other source revenues" generated by Gardner Matthews are estimated to be \$2,025,408. The total estimated revenues (property tax plus other source revenues) generated by Gardner Matthews Plantation equals \$4,603,217. The revenues generated by the plantation exceed the costs created by the plantation to the school district by \$2,109,298.

Costs/revenues--Hilton Head General Government. The municipality of Hilton Head is a limited service government, whose major function is directing Island land use planning. It is the Planning and Inspection Department's responsibility to direct Island development. The municipality also provides police protection. As of this data, the Town does not have its own police force. Consequently, the Town has contracted with the Beaufort County Sheriff's Department for police service. The Town of Hilton Head also provides the Island with a litter collection and control service.¹⁷

The costs of general government services are determined by a per capita multiplier method. The method uses a seven step process to determine total cost. Those seven steps are listed in the methodology section of this chapter, page 112. The cost/revenue calculations are included in Appendix A.6. Only the total cost/revenue values are included in this section.

¹⁷Interview with Mayor Racusin, Town of Hilton Head Island, Hilton Head Island, South Carolina, March 1984.

The total cost to the Town of Hilton Head given the development of Gardner Matthews Plantation is \$694,618. Of that total, 99 percent (\$687,672) is attributable to residential uses, while 1 percent (\$6,946) is attributable to non-residential uses.

Town revenues are based on several sources, such as property taxes, business license taxes, and building permit fees. The Town also receives funds from state and federal sources. State revenue sources include: alcoholic beverage tax, beer/wine tax, and a motor transport tax. Federal funds are the result of general revenue sharing.¹⁸

Revenues generated by property taxes, building permit fees, and a transient occupancy tax (bed tax) are derived by a per capita multiplier method. Other own-source revenues and state source revenues are determined by a proportional evaluation method. General federal revenue sharing funds are determined by a per capita method. Revenue source calculations are included in Appendix A.7. Anticipated municipal revenues by source and dollar amount are shown in Table 14.

The total revenues to be received by the municipal government from Gardner Matthews Plantation amounts to \$2,036,316. The total cost of Gardner Matthews Plantation amounts to \$694,618. Revenues generated by Gardner Matthews Plantation exceed the cost of that development by \$1,341,698.

¹⁸The Town of Hilton Head Island, "1983 Budget," August 15, 1983.

Table 14. Municipal Revenues by Source and Dollar Amount.

Own-Source Revenues	Dollars
Property Tax	\$ 288,757
Bed Tax	101,762
Building Permit	1,341,003
Other Own-Source Revenues and State Shared Funds*	277,206
Federal Funds from General Revenue Sharing	<u>27,588</u>
Total Revenues Generated	\$2,036,316

*Other own-source revenues include: cablevision franchise fee, sales of manuals/reports, miscellaneous income, interest income, and business license tax. State shared revenue sources include: alcoholic beverage tax, beer and wine tax, motor transport, bank tax, and insurance tax.

In the case of Gardner Matthews Plantation, the total overall revenues of all public agencies except Palmetto Electric, amounts to \$38,089,346. Total overall costs amount to \$14,220,114. Total overall revenues exceed total overall cost by \$23,869,232.

Other Economic Factors

This section examines the effects that the proposed development of Gardner Matthews Plantation will have on two areas of the Hilton Head economy: employment and housing.

Although increases in employment and housing can possibly have some negative impact, it is felt that the expanded employment and housing opportunities resulting from this development will have positive aggregate affects on both the private and public sectors.¹⁹

Employment

Increased employment opportunities and the associated changes in housing, wealth, and transportation considerations are probably the most important positive impacts of growth.²⁰ Hilton Head, like most municipalities, is concerned about urban growth and its effect on employment. Their interest in growth, however, is primarily concerned with the number of long-term jobs created and how many of the Island's new employees will live on or reside on the Island. The interest stems from citizen and government concern with density and

¹⁹Thomas Muller, Economic Impacts of Land Development: Employment, Housing, and Property Values (Washington, D. C.: The Urban Institute, 1976), p. 1.

²⁰Ibid., p. 9.

other problems associated with increasing population (i.e., storm water pollution, emergency evacuation, water quality, and water availability). In any case, it is important for a community to estimate employment changes associated with development.

Beyond merely estimating total employment associated with development, it is important to differentiate between those jobs which are created by the construction phase (short term) and those which may be considered as long term.

Short-term employment. New development creates both short-term private and public sector employment. It is anticipated that public employment created by the development of Gardner Matthews will be minimal. Consequently, short-term private sector employment will be the major focus of the analysis. First, employment due to "finished lot construction" is examined, followed by residential, retail commercial, and office commercial employment.

Finished lot construction employment. Finished lot construction is the placement of the necessary infrastructure (i.e., roads, bridges, overpasses, water lines, sewer lines, power lines, etc.) and desired recreation amenities before major residential/commercial construction takes place. The short-term employment opportunities generated by finished lot construction activities can be estimated if total development costs and if an average annual per employee construction wage is known. The steps to calculate finished lot construction short-term employment are:

$$\begin{array}{lcl}
 1. & \frac{\text{Total Development Costs}}{\text{x (multiplied) Estimated Labor Share of Total Construction Cost}} & = \text{Total "Finished Lot" Labor Cost} \\
 2. & \frac{\text{Total "Finished Lot" Labor Costs}}{\text{Average Annual Per Employee Construction Wage}} & = \text{Total "Finished Lot" Construction Person-Years} \\
 3. & \frac{\text{Total "Finished Lot" Construction Person-Years}}{\text{Development Time Frame}} & = \text{"Finished Lot" Construction Employment}^{21}
 \end{array}$$

Table 15 provides an estimate of finished lot construction short-term employment.

From Table 15 it is estimated that Gardner Matthews Plantation will generate 109 short-term finished lot construction jobs annually. This estimate could be higher or lower depending on the actual percentage of the labor share of total construction costs, which varies from region to region.

Residential construction employment. Residential construction within Gardner Matthews Plantation is of three basic types: single family, patio, or multi-family. The single family detached homes range in size from 1,400 square feet to 3,000 square feet. The majority of single family homes are between 1,850 square feet to 2,700 square feet. Thus, it will be assumed that the average size home in Gardner Matthews Plantation will be 2,275 square feet. The cost to build a single family detached home in Gardner Matthews is

²¹Ibid., p. 22.

Table 15. Conversion of Project Costs to Construction Labor Time-Person Years.

Item	Total
Total Development Costs 1984-1999	\$54,749,473
Estimated Labor Share of Total Construction Cost	<u> x 40%*</u>
Total "Finished Lot" Labor Costs	\$21,899,789
Average Annual Per Employee Construction Wage	\$12,557
Total Finished Lot Construction Person-Years	1,744 person-years
Development Time Frame	16 years
"Finished Lot" Construction Employment	109

* Muller, 1976, p. 21.

estimated to be \$50 per square foot. There are 684 single family lots located in Gardner Matthews Plantation.²²

Patio homes are smaller than single family detached homes. Patio homes located within Gardner Matthews Plantation will range in size from 1,700 to 2,000 square feet. The average size of a patio home in Gardner Matthews is 1,850 square feet. There are 220 patio lots or designated units located in Gardner Matthews.²³ The cost to build a patio home is \$50 a square foot.

The multi-family units located on the Island range in size from 1,200 square feet to 2,600 square feet. The average size of a

²²Interview with Bruce Black, The Hilton Head Company, Hilton Head Island, South Carolina, March 1984.

²³Ibid.

multi-family unit located within the plantation is 1,900 square feet. There are 4,496 designated multi-family units located within the confines of Gardner Matthews Plantation. The cost of multi-family construction is \$50 per square foot. Also to be located within Gardner Matthews is a guest lodge of 250 rooms. For analysis purposes the guest lodge will be treated or analyzed as if it were a multi-family unit. The average lodge room size is determined to be 15' x 25', or 375 square feet. The cost of lodge construction is estimated to be \$43 per square foot. The total of all residential construction in Gardner Matthews Plantation is 5,500 designated units.²⁴

Short-term employment generation via residential construction is a function of the size of structure, price per square foot, average Island annual construction wage, and the labor share of total construction costs. The steps used to calculate residential construction short-term employment are the same as those steps used in the calculation of finished lot construction employment, with the exception of one additional step. The additional step is the determination of the total cost of residential construction. Residential square feet must be multiplied by price per square foot of residential construction to determine the total cost of residential construction.

The residential construction employment by residential type is displayed in Table 16.

²⁴ Ibid.

Table 16. Residential Construction Employment by Type.

Residential Type	Residential Construction Employment	Residential Construction Person-Years
Single Family	155	2,478
Patio Home	41	648
Multi-Family	850	13,605
Guest Lodging	<u>8</u>	<u>128</u>
Total	1,054	16,859

The total residential construction employment given the development of Gardner Matthews Plantation amounts to 1,054 workers annually. Residential construction employment will vary considerably depending on the phasing of the project. There is no way to determine when construction on the guest lodging or multi-family units will begin, nor is there a way to determine just how many plantation single family homes or patio homes will be built in any given year.

The residential construction employment calculations are included in Appendix A-8.

Commercial construction employment. There are two types of commercial construction in Gardner Matthews Plantation: (1) retail commercial, and (2) office commercial. Retail commercial costs \$40 per square foot to build, while office commercial costs \$45 per square foot to build. The total retail commercial in Gardner Matthews Plantation is estimated to be 1,011,100 square feet. The total office commercial in Gardner Matthews Plantation is estimated to be 486,900

square feet. The retail commercial development will create 80 jobs, while it is estimated that the office commercial will generate 44 jobs. There are also 199,000 square feet of retail commercial space that will consist of wholesale/warehouse commercial businesses. The estimated cost per square foot is \$35.²⁵ Consequently, such commercial development would create 14 jobs. The total commercial employment (retail/office) created by the development of Gardner Matthews Plantation amounts to 138 jobs. Table 17 provides a summary of all short-term employment opportunities created as a result of the development of Gardner Matthews Plantation. Commercial short-term employment calculations are included in Appendix A.9.

Long-term private sector employment. There are two major types of long-term private sector employment that will be created by the development of Gardner Matthews Plantation: (1) retail employment, and (2) office employment.

Retail employment. In general, long-term retail employment estimates can be generated by one of three ways: (1) employee per square foot ratio, (2) sales per square foot ratio, or (3) merchant interviews.²⁶ In most cases, it is more feasible to use one of the two ratio methods. The selection of one ratio over another usually depends on data availability. In this analysis the employee per square foot ratio was used. The employee per square foot ratio will

²⁵Ibid.

²⁶Muller, pp. 25-27.

Table 17. Annual Summary of Short-Term Employment Generation Based on the Development of Gardner Matthews Plantation.

Construction Type	Jobs Generated
Finished Lot	109
Residential	
Single Family	155
Patio Home	41
Multi-Family	850
Guest Lodging	8
Commercial	
Retail	80
Retail (\$35)	14
Office	44
Total Short-Term Employment Opportunities	1,301

be derived by comparison to an existing Island retail facility, Pineland Mall. The steps of the model are as follows:

1.
$$\frac{\text{\# of Pineland Mall Employees}}{\text{Total Square Feet of Pineland Mall}} = \text{Jobs per square foot of retail}$$
2.
$$\frac{\text{\# of Retail Square Feet in Gardner Matthews Plantation}}{\text{by jobs per square foot}} \times (\text{multiplied}) = \text{Jobs}$$

Pineland Mall, with a gross leasable area of 100,840 square feet, employees 281 people.²⁷ Thus, Pineland Mall generates .0027866 jobs per square foot of retail. It is estimated that Gardner Matthews will have 1,011,100 square feet of gross leasable area. When multiplied by a job per square foot ratio of .0027866, it is estimated that Gardner Matthews retail will create 2,817 long-term jobs.

Office employment. The office labor force includes workers in finance, insurance, real estate, professional services, and other

²⁷Black (Interview).

It is estimated that there are eight workers per 1,000 square feet of net office space.²⁸ It is estimated that there will be a total of 413,865 square feet of net office space (net is 85 percent of gross space) in Gardner Matthews Plantation. By multiplying the net square feet of office space by .008, the worker to square foot ration, there will be an estimated total of 3,311 long-term office jobs created by the development of Gardner Matthews Plantation. Table 18 provides a summary of the total long-term private jobs created by Gardner Matthews Plantation.

Short-term public employment. Short-term public employment is created as a result of public facilities expansion or improvements to meet the needs of new residents.²⁹ Such expansion may include extending roads, building fire stations, police stations, and public schools. It is estimated that the short-term public employment generated by the development of Gardner Matthews Plantation will be minimal.

In order for job opportunities to be classified as public employment, those employment opportunities must be financed from public revenue sources such as taxes and fees. The short-term non-building construction to take place in Gardner Matthews Plantation will be paid for by the private developer. The Hilton Head Company will pay for road development and expansion, bridge construction, overpass construction, and for the placement of utility lines (water, sewer, electrical). Consequently, a majority of the short-term construction opportunities generated by Gardner Matthews Plantation are

²⁸Muller, p. 29.

²⁹Ibid., p. 23.

Table 18. Long-Term Commercial Private Jobs Created by Gardner Matthews Plantation.

Commercial Type	Jobs Generated
Retail Commercial	2,817
Office Commercial	<u>3,310</u>
Total Jobs Generated	6,127

considered private employment opportunities and not public employment opportunities. The only public employment that would result from new development would be from the expansion of public facilities.

The development of Gardner Matthews Plantation and new development within existing plantations created a need for two new fire stations. One station is still in the planning process.³⁰ Furthermore, it is anticipated that the development of Gardner Matthews Plantation will also create a need for an elementary and/or middle school.³¹

The method for estimating employment resulting from the development of public facilities is the same as the method used in determining employment from private development. The cost of a project must be converted into labor estimates.³² The number of new short-term public employee jobs directly attributable to the development

³⁰Joe Best (Interview).

³¹Ed Gaither (Interview).

³²Muller, p. 23.

of Gardner Matthews Plantation is derived by determining Gardner Matthews' proportion of future fire and school district populations. Included in Appendix A.10 are the employment calculations. Table 19 lists the estimated employment resulting from the expansion of public facilities due to the development of Gardner Matthews Plantation.

Long-term public employment. Any long-term employment generated as a result of the development of Gardner Matthews Plantation will occur in the fire, police, school, and general government sectors. The effect of new development on public employment will be determined by using employee to population ratios, with the exception of the employment projections for Hilton Head Fire District. For that, public service agency employment projections are based on an interview with Mr. Joe Best, the Hilton Head Fire District Chief.

Hilton Head Fire District. Increasing development activity in the Hilton Head Fire District (i.e., Gardner Matthews Plantation, Hilton Head Plantation, Wind Mill Harbour, etc.) created a situation in which the fire department had to expand its staff. The development of Gardner Matthews Plantation and the beginning of commercial development in Hilton Head Plantation are the major reasons for personnel expansion.³³

According to Chief Best, 24 employment positions will be created due to the increased development in his district. Nine of those 24 positions have already been filled. Furthermore, Chief Best feels that once all 24 positions have been filled, that no more personnel

³³Joe Best (Interview).

Table 19. Estimated Short-Term On-Site Annual Employment Resulting from the Expansion of Public Structural Facilities Due to the Development of Gardner Matthews Plantation.

Public Facility	# of Employment Opportunities
Fire Facilities (2)	10
Elementary/Middle School	<u>53</u>
Total	63

expansions will be necessary for 15 to 20 years.³⁴ Thus, the total staff expansion due to new development is 24.

In order to determine the number of personnel added, given the development of Gardner Matthews Plantation, it is necessary to determine Gardner Matthews proportion of future district population. It is estimated in 1999 that Gardner Matthews Plantation will house 13,475 people. It is estimated that 18,860 people, 70 percent of the total Island population, will reside in the Hilton Head Fire District in the year 1999 (see Appendix A.11). Thus, 71 percent of the future estimated district population will reside in Gardner Matthews Plantation. Consequently, it is assumed that 71 percent, or 17 of the 24 employment positions, can be attributed to the development of Gardner Matthews Plantation.

Police. The Town of Hilton Head has a contract with the Beaufort County Sheriff's Department for police protection. The Town has contracted for 17 county patrolmen. Only two of the 17 patrolmen

³⁴ Interview with the Beaufort County Sheriff's Department, Beaufort County, South Carolina, March 1984.

positions are newly created. The other 15 positions were designated from existing county patrolmen.³⁵

In 1983, an estimated 12,795 people lived on Hilton Head Island. Thus, there is a ratio of one policeman to every 753 people who reside on the Island. It is estimated that Gardner Matthews Plantation will add 13,475 people to the Island population. Based on the above ratio, 18 additional patrolmen will have to be added to the County Sheriff's Department as a result of the development of Gardner Matthews Plantation.

Beaufort County schools. All public school services on Hilton Head Island are provided by the Beaufort County School District. The school district estimates that there is one child for every four housing units on the Island.³⁶ It is estimated that there will be approximately 1,375 children or prospective students living in Gardner Matthews Plantation. However, approximately 12 percent of these children will attend private schools.³⁷ Consequently, only 1,210 children will be enrolled in the public school system. Furthermore, it is estimated that one elementary school/middle school will have to be built to accommodate those students. Based on a teacher to student ratio of one teacher per every 21 students, it is estimated that 58 teaching positions will be created, given the development of

³⁵Gaither (Interview).

³⁶The South Carolina Division of Recreation and Statistical Services, The South Carolina Statistical Abstract, 1982, p. 61.

³⁷Gaither (Interview).

Gardner Matthews Plantation.³⁸ The 58 teaching jobs are classified as certified positions.³⁹ Also, four additional non-teaching certified positions must be added to the 58 certified positions. The four additional positions consist of one principal, one assistant principal, and two guidance counselors.⁴⁰ Thus, a total of 62 certified staff positions would be created as a result of the development of Gardner Matthews Plantation. Also, there is one non-certified employee position for every four certified positions. Non-certified staff employees do not need a certificate of approval from the South Carolina State Department of Education stating that they have met all education requirements. Non-certified employees range from custodial personnel to internal auditors.⁴¹ A total of 16 non-certified staff positions would be generated as a result of the plantation development.

General government. The municipality of Hilton Head is a limited service government whose major emphasis is that of directing Island development. The Town of Hilton Head employs approximately 15 people.⁴² With a 1983 Island population of 12,795 there is a general government employee to population ratio of one employee for

³⁸Ibid.

³⁹Ibid.

⁴⁰Ibid.

⁴¹Ibid.

⁴²The Town of Hilton Head Island, "1983 Budget."

every 853 Island residents. It is estimated that in 1999 that there will be 26,942 people residing on Hilton Head Island (see Appendix A.11). Based on that population projection and the employee to population ratio, it is estimated that 32 total city employees will be employed by 1999. The population of Gardner Matthews Plantation (13,475 people) will be 50 percent of the total Island population in 1999. Thus 50 percent, or 16, of the 32 total employment positions are attributable to the development of Gardner Matthews Plantation.

Housing

In discussing the effects of new development on Island housing, it is helpful to review general Island housing statistics and also to provide a description of the existing Island housing market. Following such a description it is then appropriate to discuss the effects of new development on supply and demand.

In Beaufort County, the county in which Hilton Head Island is located, there were 27,309 total housing units in 1980. Beaufort County has also seen an annual average increase of 1,321 housing units from 1970 to 1980, for a total ten year change of 93.7 percent. As of 1980, there were an estimated 9,768 total housing units on Hilton Head Island.⁴³

The total number of occupied housing units on Hilton Head Island in 1980 was estimated to be 4,634. Of that total, 3,234 were owner occupied, with each unit having a median value of \$131,100. Also, the median contract rent on the Island in 1980 was \$334 a

⁴³The South Carolina Division of Recreation and Statistical Services, Statistical Abstract, 1982, pp. 139-141.

month. A homeowner vacancy rate in 1980 was estimated to be 3 percent, while the rental vacancy rate was 61 percent.⁴⁴

Hilton Head Island has an atypical housing situation. The situation is different in that housing demand is not only created by traditional generators (i.e., commercial development, office development), but also by intense marketing campaigns that are national and international in scope. The market is targeted towards older individuals and couples who are approaching retirement or who have already retired. Apparently, campaign efforts have been effective, for of the Islands 12,200 residents in 1982, 40 percent, or 5,200, of these total residents did not work, or at least they did not work on the Island.⁴⁵ However, it is very unlikely, given the high cost of living on the Island, that a majority of these 5,200 people just live on the Island and work some place else, even though it is possible that a small percentage may commute to the mainland for employment.

Another apparent unique aspect of the Island housing market is the minimal effect of filtering on the existing housing stock. The construction of additional residential units would tend to have little effect on downward or upward filtering given the newness of the existing housing stock, the value of existing housing stock, and home owner, and renter upper-class socio-economic characteristics.

⁴⁴Ibid.

⁴⁵Gardo, Doughtie, and Rose, "Hilton Head Island Business and Employment Survey--1982." (Prepared for the Hilton Head Island Chamber of Commerce, South Carolina, 1983, p. 9).

Taking a variety of factors into consideration, the development of Gardner Matthews Plantation will increase both the supply of housing and the demand for housing. The total addition to the supply will be 5,500 units to include patio homes, multi-family units, and single family detached dwellings. The demand for housing will increase because a certain percentage of people will want to live near their work and also will want to live on the Island for its abundant recreation amenities and beauty.

An important demand characteristic that needs to be determined is the percentage of the new employees that will live, as well as work, on the Island. Those new employees expected to work and live on the Island can be determined by comparing the number of on-Island workers to off-Island workers (commuters).

In 1982 there were 7,028 (58 percent) on-Island residents employed, as compared to 5,116 (42 percent) off-Island employees. The number of off-Island employees is also expected to increase. This is based on the fact that over the past four years the Island has experienced a 57 percent (1,859 employees) increase in off-Island commuters. They account for 37 percent, or 1,899 of the commuting employees. The firms showing the greatest rise in commuter employment include financial/insurance/real estate with a 936 percent increase; government and schools with a 208 percent increase; and the professional and service businesses with a 144 percent increase.⁴⁶

⁴⁶Gardo, Doughtie, and Rose, pp. 9-12 A-R.

The result of the above factors is to lessen the effect of the development of Gardner Matthews Plantation on Island housing demand by approximately 42 percent. It is estimated that of the total 7,621 jobs created by the development of Gardner Matthews Plantation that only 3,201 of those employees will work and live on the Island. Obviously, the high cost of Island living has and will have a significant impact on the Island Housing market.

In summary, the cost and revenues generated by the development of Gardner Matthews Plantation over a 16 year period are substantial. Total public revenues created as a result of the development amount to \$38,089,364. Total public revenues exceed total public costs (\$14,220,114) by a 2 to 1 margin, or \$23,869,232. Private gross revenues amount to \$308,498,288, while private gross costs amount to \$54,749,473. Private revenues exceed private costs by \$253,748,815. Private and public revenues combined equal \$346,587,634. Public and private costs totaled equal \$68,969,587. Total revenues exceed total costs by \$279,618,047.

From an employment standpoint, the development of Gardner Matthews will create a total of 7,621 jobs. The majority of jobs created will be in the long-term commercial (office/retail) category. It is estimated that 6,128 (80 percent) long-term commercial jobs will be created as a result of the development of Gardner Matthews. Also, another 1,301 (17 percent) jobs will be created in the short-term private employment category. The short- and long-term public employment opportunities generated as a result of Gardner Matthews Plantation accounts for two percent, or 176, of the 7,621 jobs. The

remaining one percent of employment opportunities are attributable to other Island development.

Furthermore, it is estimated that the plantation will have a pronounced impact on the Island housing market. In conclusion, it seems as if Gardner Matthews Plantation will have a positive effect on both the economic and fiscal structures of the Island.

CHAPTER VI

CONCLUSIONS

This thesis has discussed both environmental planning theory and economic/fiscal impact assessment theory. In comparing theory to practice, this thesis described the Gardner Matthews Plantation Planning Process and assessed the economic/fiscal impacts of Gardner Matthews Plantation. This chapter will focus on what has been learned as well as opinions that have been formed during the course of the study.

In Chapter III, it was shown that an environmental planning process in theory requires a detailed environmental inventory, a structured approach to evaluating alternatives, and the involvement of a multi-disciplinary team. Chapter III also emphasized that sub-systems of the natural environment need to be systematically analyzed within the traditional planning/development process.

In describing the Gardner Matthews Plantation Planning/Development Process, it was learned that an environmental planning process was not a component of the plantation planning process. There was no attempt by the Hilton Head Company to assess the effects of development on natural environmental systems and features. What the planning process did include was a limited environmental (e.g., tree, wetland) inventory and a land use inventory. These inventories, when combined, can be considered an overly simplistic environmental

planning method. The simplicity of the method becomes evident when compared to environmental planning methodologies which were reviewed in Chapter III. In comparison, an inventory is only an initial step or component of an environmental planning process. Based on the fact that such a limited inventory was conducted, several questions are raised about the development planning process. First, should the environmental planning process be included as a component of the Hilton Head Company Development Process? Second, should the environmental methodology used in the Gardner Matthews Plantation Planning Process be more reflective of those environmental planning methodologies reviewed? Third, should the data produced by such environmentally sensitive methodologies be used as land use locational determinants within Gardner Matthews Plantation and Hilton Head Island?

In response to the first question, it is felt that the environmental planning process should be included as a component of the Hilton Head Company Development Process. By including the environmental process, it is believed that environmental/development conflicts can be better identified and consequently resolved by adjusting and using development practices that will be more sensitive to the tolerance and intolerance of environmental systems and features.

Regarding the second question, it is believed that a more indepth environmental planning method should be used by the Hilton Head Company. A method should be used that identifies both environmental and development conflicts and problems. The method used must also be capable of identifying solutions to those problems/conflicts.

The environmental planning methods recommended, however, should not be used to determine land use locations within Gardner Matthews Plantation or for Hilton Head Island, because: first, land use patterns on Hilton Head Island have been well established since the 1960's. In order to effectively locate land uses based on an environmental capability analysis or an environmental suitability analysis, those analyses should proceed development. Once land use patterns are established, as is the case in Hilton Head, it is not feasible to base land use locations on environmental criteria. Furthermore, it is felt that for a traditional environmental methodology to be used as a land use location determinant, it needs to be done for the entire Island and not just one plantation or development. Second, the resort development market along with U. S. Highway 278, Calibogue Sound, Broad Creek, and the Atlantic Ocean, have been and are the major land use location determinants. In general, lower intensity land uses, with the exception of hotels, are located along or within view of the Island's water features, while plantation entrances and higher intensity uses are located adjacent to U. S. 278. The Island's land use location criteria are well established and to change such criteria is not justifiable.

Two other issues that need to be addressed are the public and private development perspectives. The public perspective on the Island is somewhere between growth control and anti-growth. Anti-growth sentiments were reflected by the imposition of the 1983 sewer moratorium and by the fact that the City and its residents in 1984 threatened to impose another moratorium on the Island in order to

stop development. The quality and quantity of growth should now be controlled by the Island's Development Standard Ordinance. The quality of development is controlled by strict specification and performance standards, while the quantity of growth is controlled by a dwelling unit limitation ordinance. In the case of Gardner Matthews Plantation, although the development standards did not apply, they did limit development to four dwelling units per gross acre.

An alternative to the dwelling unit limit is to allow density to vary. Such an approach would not control the quantity of growth, but it would alleviate the problem of artificially limiting the amount of developable land within a plantation. By removing the gross four dwelling units per acre density cap and letting the market decide density levels could allow for higher quality development if stricter development standards on higher densities were imposed.

The private sector is responsive to the market. For instance, the Hilton Head Island market demands aesthetically pleasing developments. Consequently, all Hilton Head Company Plantations are constructed to be visually attractive and pleasing. Private developers in theory will not go beyond market needs unless it is required by regulation. In the case of Gardner Matthews Plantation, the new development standards did not apply; however, the developers contend that in responding to the market they exceed its requirements. This is a unique case; however, in general, developers only provide what is required by market and regulations.

The economic and fiscal impacts of Gardner Matthews Plantation on Hilton Head Island are positive. From an economic standpoint,

thousands of jobs will be created, and quality housing will be added to the existing Island housing stock. From a fiscal perspective both public and private entities will benefit. The Hilton Head Company stands to receive over \$45,000,000 in net revenues. However, it should be remembered that cost in this context is development cost and does not include acquisition, interest, inflation, or discounted values. The Town of Hilton Head and the several public agencies that will serve Gardner Matthews Plantation will receive \$38,089,346 in revenues and only will incur \$23,869,732 in costs, for a 2:1 revenue/cost ratio. The public and private revenues generated by the development of Gardner Matthews raise several points. First, given the large amount of private revenues generated, the Hilton Head Company should take a portion of that revenue and use it to incorporate an environmental planning process, including an extensive environmental inventory in their development planning process in order to avoid environment/development conflicts and insure environmental protection. Second, when considering the public revenues that are generated with the existing stringent development standards, a question arises as to why such a growth control/anti-growth attitude exists among the Island's residents. When considering growth/no growth questions, Island residents need to look beyond their own interests and consider the interests of Beaufort County as well as the interest of the Low-county Region.

Some of these increased public revenues and private revenues should be invested back in Hilton Head Island--first, to correct existing environmental problems; and second, to provide more

moderately priced housing opportunities. The cost of housing on Hilton Head Island is exceptionally high. A great many of the construction workers and business employees cannot afford to live on the Island. They live in the county and surrounding region. The county and region provide these workers public facilities and services. It appears that the surrounding region is bearing some of the tax burden and public service costs for the workers who in part provide the public revenues for the Town of Hilton Head and private revenues for the Hilton Head Company. This raises a question of equity. Therefore, it would be appropriate for the developers and city to develop a mechanism in which they would share in the cost of providing moderately priced housing opportunities on the Island for these workers.

In considering Hilton Head Island development, two questions must be asked. First, what can be learned from Gardner Matthews Plantation that can be applied to other similar developments? Second, what future Island development studies and future research need to be conducted? The Gardner Matthews Plantation case study review points out the need to:

1. Go beyond aesthetic appearances in development planning,
2. Have more public involvement if environmentally sensitive development is to be achieved.
3. Incorporate environmental development goals and objectives as well as an environmental analysis methodology into the development process.

4. Require economic and fiscal analyses and have information obtained from such analyses used in the public decision making process.

Future Island studies could include a cost/benefit analysis and a regional economic analysis. A cost/benefit analysis is recommended so the tangible and intangible costs and benefits of Island development can be compared. A cost/benefit analysis could be conducted to reflect the environmental concerns of Island residents and public agencies. It is also recommended that a regional economic analysis be conducted in order to determine the impacts and the importance of Hilton Head Island development on the Lowcountry Region of South Carolina. Future research also needs to be conducted in the area of environmental planning methodologies for areas that have undergone substantial urbanization.

In conclusion, it is important that developers and public agencies be provided with more environmental and economic information so that more rational development decisions can be made. Also, it is essential that individuals and public agencies become involved in development and decision making because it is public and private awareness and involvement that is the key to assuring environmentally sensitive development.

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APPENDIX

APPENDIX A COST, REVENUE, AND EMPLOYMENT CALCULATIONS

Appendix A.1

Gardner Matthews Plantation (GMP) Population Estimation Method

Total number of GMP Housing Units	x	Average Number of Persons Per Household, Hilton Head Island
5,500*	x	2.45**
	=	Estimated GMP Population
	=	13,475 (Assumes 100% of Occupancy)

*Source: GMP Master Plan

**Source: 1982 South Carolina Statistical Abstract, p. 144.

Appendix A.2

Hilton Head Fire District Costs Estimation Method

1983-84 Fire Department Budget Total + Estimated 1983 District Population
 898,768* 6,398** = total permanent

island population (12,795) x the
 percentage of Island residents
 located within that fire district
 (50%)***.

= Per Capita
 Fire Protection Service Cost
 \$140.00

1983 Population estimate (12,795) is
 based on an annual increase of 6.81%.

Per Capita Fire Service Cost x GMP Estimated Population = Total Cost of Fire
 District to serve GMP
 \$140.00 x 13,475 = \$1,886,500

*Source: Hilton Head Island Fire District Budget Information and Annual Report for 1984-85.

**Source: Thomas E. Bowles, "Technical Paper #1, Population, Hilton Head Island Land Use Plan," Beaufort County Joint Planning Commission, Beaufort South Carolina, August 4, 1980, p. 9.

***Source: Hilton Head Island Fire District Master Plan (Phased), August 26, 1983, p. 6.

Appendix A.3

Hilton Head Island Fire District Property Tax Revenues generated as a result of the development of Gardner Matthews Plantation - procedure, method, and formula. In order to determine the property tax revenues generated as a result of the development of Gardner Matthews Plantation, it was first necessary to determine the residential, commercial, industrial, and personal property values of the plantation. Next, market values are converted to assessed values by applying the appropriate assessment rate. Once assessed values are determined, the appropriate millage rate(s) are applied to those assessed values to determine property tax revenues.

a. Method to calculate residential lot market value

<u>Type of Lot</u>	<u>Number Sold</u>	x	<u>1983 Base Value</u>	=	<u>Market Value</u>
Estate Lots					
Golf Front Lots	10*	x	\$145,000**	=	\$1,450,000
Lagoon Front Lots	4	x	\$90,000	=	\$360,000
Interior Lots	15	x	\$60,000	=	\$900,000
Single Family Lots					
Golf Front Lots	459	x	\$62,500	=	\$28,687,500
Lagoon Front Lots	141	x	\$50,000	=	\$7,050,000
Nature Preserve Lots	21	x	\$45,000	=	\$945,000
Interior Lots	63	x	\$35,000	=	\$2,205,000
Patio Lots					
Golf Front Lots	97	x	\$40,000	=	\$3,880,000
Lagoon Front Lots	65	x	\$37,500	=	\$2,437,500
Nature Preserve Lots	0	x	\$35,000	=	0
Interior Lots	<u>58</u>	x	\$25,000	=	<u>1,450,000</u>
TOTAL	933				\$49,365,000

Multi-family lot market value (inside plantation)

<u>Type of Lot</u>	<u>Number Sold</u>	x	<u>1983 Base Value</u>	=	<u>Market Value</u>
Harborside	248	x	\$40,000	=	\$9,920,000
Marsh/Harborside	122	x	\$50,000	=	\$6,100,000
Harbor Village	63	x	\$17,500	=	\$1,102,500
Marsh/Harbor	566	x	\$22,500	=	\$12,735,000
West Marsh	312	x	\$22,500	=	\$7,020,000
Golf/Lagoon	194	x	\$20,000	=	\$3,880,000
Lagoon Front	240	x	\$13,500	=	\$3,240,000
Lagoon Front	540	x	\$15,000	=	\$8,100,000
Cluster Houses	129	x	\$22,500	=	\$2,902,500
Golf Club Villas	190	x	\$25,000	=	\$4,750,000
Golf Club V.I.P.	8	x	\$40,000	=	\$320,000

Multi-family lot market value (outside plantation)

Marsh Front	335	x	\$15,000	=	\$5,025,000
Lagoon Front	213	x	\$12,000	=	\$2,556,000
Lagoon Front	111	x	\$12,500	=	\$1,387,500
Interior	46	x	\$7,500	=	\$345,000
TOTAL	3,317**				\$69,383,500

*Source: GMP Budget

**There is a total of 4,496 multi-family units/lots in GMP. It is estimated that 3,317 units/lots (74%) of the total available units will be sold by 1999. Thus, the total multi-family market value and the total assessed value, and consequently total property tax revenues, are only 74% of the actual multi-family total values.

b. Method to calculate residential (structural) market value

Type	Avg. Estimated 1983 Value	x	Number of Units	=	Market Value
Single Family Home	\$113,750*	x	684	=	\$77,805,000
Multi-Family Home	\$95,000*	x	4,496	=	\$427,120,000
Patio Home	\$92,500*	x	220	=	\$20,350,000

*Source: Interview with Bruce Black and several Island builders.

c. Method to calculate Northridge commercial (office/retail) land market value (1983 value)

Total Commercial Acres	x	Commercial Acre Value	=	Market Value
78*	x	\$200,000**	=	\$15,600,000

*Source: GMP Master Plan

**Source: The Hilton Head Company

d. Method to calculate marina commercial area land market value - 1983 value

Acres	x	Value	=	Market Value
11.4*	x	\$100,000*	=	\$1,140,000

*Source: GMP Budget

e. Method to calculate town center/non-residential tracts land market value - 1983 value

Town Center

Acres	x	Value	=	Market Value
112.30*	x	\$50,000*	=	\$5,615,000

*Source: GMP Budget

Note: Value of Town Center property is assumed to be \$50,000/acre

Non-Residential (Industrial/Commercial)

Industrial

Acres	x	Value	=	Market Value
13*	x	\$50,000**	=	\$658,000

*Source: GMP Budget and Interview with Bruce Black

**Source: GMP Budget

Commercial

Acres	x	Value	=	Market Value
19.9*	x	\$50,000*	=	\$987,000

*Source: GMP Budget

f. Method to calculate commercial business property (structure) GMP market value - 1983 value

Estimated Retail Square Feet GMP

68,000	
375,000	
312,900	(31.29/Ac.)*
53,000	(5.3/Ac.)*
88,200	(8.82/Ac.)*
114,000	(11.4/Ac.)*

Total: 1,011,100

Estimated Office Square Feet GMP

134,100	(13.41/Ac.)*
352,800	(35.28/Ac.)*

Total: 486,900

Commercial (\$30-\$35) retail square feet (GMP)

199,000	(19.9/Ac.)*
Total: 199,000	

*Assumes 10,000 square feet of office/retail space for every one acre. Source: Interview with Bruce Black

Market Value GMP Retail

Total (retail) Square Feet	x	Price per Square Foot	=	Market Value
1,011,100	x	\$40.00*	=	\$40,444,000

Market Value GMP Office

Total (office) Square Feet	x	Price per Square Foot	=	Market Value
486,900	x	\$45.00*	=	\$21,910,500

Market Value GMP Commercial (\$30-\$35) Retail Square Feet

Total Retail Square Feet	x	Price per Square Foot	=	Market Value
199,000	x	\$30.00*	=	\$5,970,000

*Source: Interview with Bruce Black and several Island developers.

g. Personal Real Property Assessed Value Hilton Head Island by District (500-550) - 1983*

District 500
Motor Vehicle \$715,719
Other \$946,373

District 530
Motor Vehicle \$683,093
Other \$471,898

District 501
Motor Vehicle \$3,110
Other —

District 540
Motor Vehicle \$1,167,522
Other \$1,597,530

District 510
Motor Vehicle \$1,008,719
Other \$1,158,274

District 550
Motor Vehicle \$2,940,476
Other \$1,867,476

District 520
Motor Vehicle \$744,047
Other \$643,313

Total Hilton Head Island Personal Real Property Assessed Value = \$13,947,550

*Source: Beaufort County Tax Assessor's Office.

Method to calculate personal real property assessed value GMP

Total Hilton Head Island Real Property Assessed Value	+	Estimated 1983 Island Population	=	Per Capita Assessed Value
\$13,947,550	+	12,795	=	\$1,090.08

Per Capita Assessed Value	x	Estimated GMP Population	=	GMP Assessed Personal Property Value
\$1,090.08	x	13,475	=	\$14,688,828

h. Method to calculate residential lot assessed value

Market value estate lots, single family lots, and patio lots	x	Assessment rate	=	Assessed Value
\$49,365,000	x	.06*	=	\$2,961,900
Market Value MF lots,	x	Assessment rate	=	Assessed value
\$69,383,500	x	.06*	=	\$4,163,010

*Source: Beaufort County Tax Assessor's Office

i. Method to calculate residential (structure) assessed value

Market value single family homes	x	Assessment Rate	=	Assessed Value
\$73,710,000	x	.04	=	\$2,948,400
Market value MF homes	x	Assessment Rate	=	Assessed Value
\$213,560,000	x	.06*	=	\$12,813,600
\$213,560,000	x	.04**	=	\$ 8,542,400
Market value patio homes	x	Assessment Rate	=	Assessed Value
\$20,350,000	x	.04	=	\$814,000

*Assumes 50% are rental apartments.

**Assumes 50% are primary residences

j. Method to calculate commercial land assessed values

Marina commercial area market value	x	Assessment Rate	=	Assessed Value
\$1,140,000	x	.06	=	\$68,400
Town Center tract market value	x	Assessment Rate	=	Assessed Value
\$5,615,000	x	.06	=	\$336,900

Non-Residential Tract

Industrial Market Value	x	Assessment Rate	=	Assessed Value
\$658,000	x	.105	=	\$69,090
Commercial Market Value	x	Assessment Rate	=	Assessed Value
\$987,000	x	.06	=	\$59,220

Northridge

Northridge Market Value	x	Assessment Rate	=	Assessed Value
\$15,600,000	x	.06	=	\$936,000

k. Method to calculate commercial business property (structure) assessed values

Commercial retail market value	x	Assessment Rate	=	Assessed Value
\$40,444,000	x	.06	=	\$2,426,640
Commercial office market value	x	Assessment Rate	=	Assessed Value
\$21,910,500	x	.06	=	\$1,314,630
Commercial retail market value	x	Assessment Rate	=	Assessed Value
(\$30-\$35)				
\$5,970,000	x	.06	=	\$358,200

l. Method to calculate property tax revenues generated to the Hilton Head Fire District given the development of Gardner Matthews Plantation

Fire District can expend up to 21 mills. Assumes a 21 mill levy.

Source: Chief Joe Best, Hilton Head Island Fire District

Assessed value single family detached lots	x	Mill Levy	=	Property Taxes
\$2,961,900	x	21 mills (.021)	=	\$62,199.90
Assessed value multi-family lots	x	Mill Levy	=	Property Taxes
\$4,163,010	x	21 mills (.021)	=	\$87,423.21
Assessed value single family homes	x	Mill Levy	=	Property Taxes
\$2,948,400	x	21 mills (.021)	=	\$61,916.40
Assessed value multi-family homes	x	Mill Levy	=	Property Taxes
\$12,813,600	x	21 mills (.021)	=	\$269,085.60
\$ 8,542,400	x	21 mills (.021)	=	\$179,390.40
Assessed value patio homes	x	Mill Levy	=	Property Taxes
\$814,000	x	21 mills (.021)	=	\$17,094.00
Property Taxes Generated				= \$677,109.51

Total assessed value of commercial/industrial/land structure

Total assessed value	x	Millage Rate	=	Property Taxes
\$5,569,080	x	21 mills (.021)	=	\$116,950.68

Personal Real Property GMP

Estimated Assessed Value	x	Mill Levy	=	Property Taxes
\$14,688,828	x	21 mills (.021)	=	\$308,465.39

Overall Total Property Taxes Generated to the Hilton Head Island Fire District = \$1,102,525.60

Appendix A.4

Methods to calculate revenues generated by Gardner Matthews Plantation to the Hilton Head #1 Public Service District

a. Aid to construction fees

\$4,630,680 - revenue taken from GMP budget

b. Property taxes

Gardner Matthews Plantation				
Assessed Value	x	Mill Levy	=	Property Taxes
\$52,501,218	x	1.21 (.0012)	=	\$63,001

c. Water services

Total Annual Water Consumption	x	Water Rate	=	Total revenue
2,200,000 x 365 = 803,000,000	x	\$10/5,000 gal.		from water
		\$25/1,000 gal.		changes
		(over 5,000 gal.)		attributable
				to growth
				\$20,074,885

d. Total Annual Wastewater Consumption	x	Wastewater Rate	=	Total revenue
1,200,000 x 365 = 438,000,000	x	\$5/5,000 gal.		from water
		\$8/1,000 gal.		charges
		(over 5,000 gal.)		attributable
				to growth
				\$350,401

e. Tap-in fees

1983 Tap-in Fees	+	1983 District Population	=	Per Capita Tap-in Fees
\$20,000*	+	2,500	=	\$8.00
Per Capita Tap-in Fees	x	Estimated GMP Population	=	Revenues from Tap-in Fees
\$8.00*	x	13,475	=	\$107,800

*Source: Hilton Head #1 PSD Operating Budget 1983-84 Fiscal Year.

f. Miscellaneous

1983 Miscellaneous fees	÷	1983 district population	=	Per Capita Miscellaneous Fees
\$7,970*	÷	4,500	=	\$3.19
Per capita miscellaneous fees	x	Estimated GMP population	=	Miscellaneous from revenues
\$3.19*	x	13,475	=	\$42,958

*Source: Hilton Head #1 PSD Operating Budget 1983-84 Fiscal Year.

Appendix A.5

Method to calculate the number of estimated students generated by the development of Gardner Matthews Plantation

a. Hilton Head Island has a ratio of one child per every four households

$$\begin{array}{rclcl} \text{Total \# of units in GMP} & \times & \text{Child/household ratio} & = & \text{Estimated number of children} \\ 5,500* & \times & .25** & = & 1,375 \end{array}$$

*Source: GMP Master Plan

**Source: Beaufort County Schools

b. It is also estimated that 12% of the children on the Island attend private schools.

$$\begin{array}{rclcl} \text{Estimated Number of} & & \text{Percentage of} & & \text{Estimated Number of} \\ \text{Children} & \times & \text{Children Attending} & = & \text{Children that will} \\ & & \text{Private Schools} & & \text{attend public schools} \\ 1,375 & \times & 12\%* & = & 121 \end{array}$$

Source: South Carolina Statistical Abstract 1982.

c. Method to calculate Beaufort County School District "other source revenues" generated by Gardner Matthews Plantation.

Proportional evaluation method

$$\text{Step 1} \quad 56x \quad = \quad 2,577,809 \text{ (estimated property for revenues)}$$

$$\text{Step 2} \quad \frac{56x}{56} \quad = \quad \frac{2,577,809}{56}$$

$$\text{Step 3} \quad 1x \quad = \quad 46,032$$

$$\text{Step 4} \quad 44 \times 46,032 = \$2,025,408$$

$$\text{"Other Source Revenues"} \quad = \quad \$2,025,408$$

Appendix A.6

Method to calculate total cost to the Town of Hilton Head given the development of Gardner Matthews Plantation

- a. Step 1
Obtain total annual municipal expenses

- b. Step 2
Assign a share of annual municipal expenditures to existing non-residential uses

$$\frac{\text{equalized non-residential real property}}{\text{total local taxable equalized real property value}} = \text{Non-residential share of total local real property value}$$

$$\frac{460,434,072}{2,717,018,322} = .17$$

$$\frac{\text{non-residential real property value}}{\text{non-residential land parcels}} = \frac{\$460,434,072}{2,625} = \$175,403 \text{ per parcel}$$

$$\frac{\text{total local real property value}}{\text{total local land parcels}} = \frac{\$2,717,018,322}{24,713} = \$109,940 \text{ per parcel}$$

$$\text{Ratio of non-residential to average parcel value} = 1.60$$

$$\begin{array}{l} \text{Total Municipal Expenditures} \times \text{Simple Proportion of Non-Residential to Local Real Property Values} = \text{Refinement Coefficient} \\ \$936,248.52 \times .17 \times 1.75 \\ = \text{Total Existing Municipal Expenditures Attributable to Non-residential Uses} \\ \$278,534 \end{array}$$

- c. Step 3
Calculate net annual per capita expenditures

$$\begin{array}{l} \text{Total Annual Expenditures} - \text{Municipal Expenditures Attributable to Non-Residential Uses} = \text{Net Annual Per Capita Expenditures} \\ \$936,248 - \$278,534 = \$657,714 \end{array}$$

$$\frac{\text{Net Annual Expenditures}}{\text{Estimated 1983 Population}} = \text{Net Annual Per Capita Expenditures}$$

$$\frac{\$657,714}{12,795} = \$51.40$$

d. Step 4

Calculate anticipated total population GMP

$$\begin{array}{rcl}
 \text{Total number of GMP housing units} & \times & \text{Average Number of Persons per Household} \\
 5,500 & \times & 2.45 \\
 = & & \text{Estimated Population} \\
 = & & 13,475 \text{ (Assumes 100\% occupancy)}
 \end{array}$$

e. Step 5

Calculate residentially induced total annual municipal expenses

$$\begin{array}{rcl}
 \text{Net Annual Per Capita Expenditures} & \times & \text{Total Projected Population} \\
 \$51.40 & \times & 13,475 \\
 = & & \text{Total Annual Municipal Expenses} \\
 = & & \$692,668.71
 \end{array}$$

f. Step 6

Calculate municipal costs for inclusive non-residential uses

Retail

$$\begin{array}{rcl}
 \text{Size (ft}^2\text{)} & \times & \text{Annual Rent Per Ft}^2 \\
 1,011,100 & \times & \$4.50 \\
 & \times & \text{Gross Income Multiplier} \\
 & & 6.81 \\
 = & & \text{Value} \\
 = & & \$30,985,160
 \end{array}$$

$$\begin{array}{rcl}
 \text{Total Municipal Expenditures Assigned to the Non-Residential Sector} & \times & \text{Simple Proportion Valuation of the Retail to Total Local Non-Residential Real Property Value} \\
 \$278,534 & \times & \frac{30,985,160}{460,434,072} = .07 \\
 & \times & \text{Refinement Coefficient} \\
 & & .06 \\
 = & & \text{Retail Annual Municipal Costs} \\
 = & & \$1,169.84
 \end{array}$$

Office

$$\begin{array}{rcl}
 \text{Size (Ft}^2\text{)} & \times & \text{Annual Rent Per Ft}^2 \\
 486,900 & \times & \$7.25 \\
 & \times & \text{Gross Income Multiplier} \\
 & & 5.17 \\
 = & & \text{Value} \\
 = & & \$18,250,229
 \end{array}$$

$$\begin{array}{rcl}
 \text{Total Municipal Expenditures Assigned to the Non-Residential Sector} & \times & \text{Simple Proportion Valuation of the Office Space to Total Local Non-Residential Real Property Value} \\
 \$278,534 & \times & \frac{18,250,229}{460,434,072} = .04 \\
 & \times & \text{Refinement Coefficient} \\
 & & .07 \\
 = & & \text{Office Annual Municipal Costs} \\
 = & & \$780
 \end{array}$$

g. Step 7

Determine total annual public costs

Residentially induced total annual costs	=	\$692,668
Retail annual municipal costs	=	1,170
Office annual municipal costs	=	780
Total Municipal Cost		<u>\$694,618</u>

Appendix A.7

Methods to Calculate Municipal Revenues

a. Property Taxes

$$\begin{array}{rclcl} \text{GMP Assessed Value} & \times & \text{Millage Rate} & = & \text{Municipal Property Taxes} \\ \$52,501,218 & \times & 5.5 (.0055) & = & \$288,757 \end{array}$$

b. Bed Tax

$$\begin{array}{rclcl} \text{Number of New} & \times & \text{Daily Motel/Hotel} & = & \text{Number of Rooms} \\ \text{Motel/Hotel Rooms} & & \text{Occupancy Rate} & & \text{Rented Daily} \\ 250 & \times & 68\% & = & 170 \end{array}$$

$$\begin{array}{rclclcl} \text{Number of Rooms} & \times & \text{Daily Rate} & \times & \text{Bed} & \times & \text{Number of} \\ \text{Rented Daily} & & \text{Per Room} & & \text{Tax} & & \text{Days} \\ 170 & \times & \$82.00 & & 2\% (.02) & \times & 365 \end{array}$$

$$= \text{Revenues from Bed Tax Attributable to Growth}$$

$$\$101,762$$

c. Building Permit

$$\begin{array}{rclcl} \text{Market Value} & & \text{Valuation Rate} & & \text{Number} \\ \text{Single Family Homes} & / & \$236.50 \text{ for first} & = & \text{of Units} \\ & & 100,000 + \$1.25 \text{ for} & & \\ & & \text{each additional 1,000} & & \\ & & \text{or fraction thereof} & & \\ \$113,750 & / & \$236.50 + 17.19 = \$253.69 & \times & 684 \end{array}$$

$$= \text{Building Permit Revenues}$$

$$\$173,522$$

$$\begin{array}{rclcl} \text{Market Value} & & \text{Valuation Rate} & & \text{Number} \\ \text{Multi-Family Homes} & / & \$136.50 \text{ for first} & = & \text{of Units} \\ & & 50,000 + \$2.00 \text{ for} & & \\ & & \text{each additional 1,000} & & \\ & & \text{or fraction thereof} & & \\ \$95,000 & / & \$136.50 + 90.00 = \$226.50 & \times & 4,496 \end{array}$$

$$= \text{Building Permit Revenues}$$

$$\$1,018,344$$

Market Value Patio Homes	/	Valuation Rate \$136.50 for first 50,000 + \$2.00 for each additional 1,000 or fraction thereof	=	Number of Units
\$92,500	/	\$136.50 + 85.00 = \$221.50	x	220
= Building Permit Revenues \$48,730				

Total Market Value Commercial (office/retail) Structures GMP	/	Valuation Rate \$736.50 for first 500,000 + \$.75 for each additional 1,000 or fraction thereof	=	Building Permit Revenues
		$\frac{68,324,500}{500,000} = 136.65$		
		$136 \times 736.50 = \$100,164$		
		$\frac{324,500}{1,000} = 324.50$		
\$68,324,500	/	\$324.50 x .75 = \$243.38	x	\$100,407

= Total Building Permit Revenues
\$1,341,003

d. Other Own-Source Revenues and State Shared Funds

Proportional Evaluation Method

Step 1 50x = \$288,757

Step 2 $\frac{50x}{50}$ = $\frac{\$288,757}{50}$

Step 3 x = \$5,775.14

Step 4 48* x \$5,775.14 = \$277,206

Total Own-Source Revenues and State Shared Funds = \$277,206

*General Revenue Sharing (Federal Funds) is the other 2%.

e. Federal Funds from General Revenue Sharing

<u>1983 General Revenue Sharing Funds</u>		=	Per Capita Federal Funds
1983 Population			
<u>\$26,196</u>		=	\$2.05
12,795			
Per Capita Federal Funds	x	GMP Estimated Population	= General Revenue Sharing Funds
\$2.05	x	13,475	= \$27,588

Appendix A.8

Method to Calculate Residential Construction Employment

a. Single Family - Total Development Costs = \$77,805,000

$$\begin{array}{rclclcl}
 \text{Average Size Single} & & & & & & \\
 \text{Family Home in GMP} & \times & \text{Price per Square Foot} & \times & \text{\# of Single Family Units} & & \\
 2,275 & \times & \$50 & \times & 684 & & \\
 = & \text{Total Development Costs} & & & & & \\
 = & \$77,805,000 & & & & &
 \end{array}$$

Estimated Labor Share of Total Construction Cost = 40%
 Total Single Family Labor Costs = \$31,122,000

$$\begin{array}{rcl}
 \text{Total Development Costs} & \$77,805,000 & \\
 \text{Estimated Labor Share of} & & \\
 \text{Total Construction Costs} & & .40 \\
 \text{TOTAL} & \underline{\$31,122,000} &
 \end{array}$$

Average Annual Per Employee Construction Wage = \$12,557
 Total Single Family Construction Person-Years = 2,478.46

$$\frac{\text{Total Single Family Labor Costs}}{\text{Average Annual Per Employee Construction Wage}} = \frac{\$31,122,000}{\$12,557} = 2,478.46$$

Single Family Construction Employment = 155

$$\frac{\text{Total Single Family Construction Person-Years}}{\text{Development Time Frame}} = \frac{2,478.46}{16 \text{ yrs.}} = 155$$

b. Patio Home - Total Development Costs = \$20,350,000

$$\begin{array}{rclclcl}
 \text{Average Size Patio Home GMP} & \times & \text{Price per Square Foot} & \times & \text{Number of Patio Homes} & & \\
 1,850 \text{ square feet} & \times & \$50 & \times & 220 & & \\
 = & \text{Total Development Costs} & & & & & \\
 = & \$20,350,000 & & & & &
 \end{array}$$

Estimated Labor Share of Total Construction Costs = 40%
 Total Patio Home Labor Costs = \$8,140,000

$$\begin{array}{rcl}
 \text{Total Development Costs} & \$20,350,000 & \\
 \text{Estimated Labor Share of} & & \\
 \text{Total Construction Costs} & & .40 \\
 \text{TOTAL} & \underline{\$8,140,000} &
 \end{array}$$

Average Annual Per Employee Construction Wage = \$12,557
 Total Patio Home Construction Person-Years = 648

$$\frac{\text{Total Patio Home Labor Costs}}{\text{Average Annual per Employee Construction Wage}} = \frac{\$8,140,000}{\$12,557} = 648$$

Patio Home Construction Employment = 41

$$\frac{\text{Total Patio Home Construction Person-Years}}{\text{Development Time Frame}} = \frac{648}{16} = 41$$

c. Multi-Family - Total Development Costs = \$427,120,000

Average Size Multi-Family Unit GMP	x	Price per Square Foot	x	# of Single Family Units
1,900 square feet	x	\$50	x	4,496
= Total Development Costs				
= \$427,120,000				

Estimated Labor Share of Total Construction Cost = 40%
 Total Multi-Family Labor Costs = \$170,850,000

Total Development Costs	\$427,120,000
Estimated Labor Share of Total Construction Costs	.40
TOTAL	\$170,850,000

Average Annual Per Employee Construction Wage = \$12,557
 Total Multi-Family Construction Person-Years = 13,606

$$\frac{\text{Total Multi-Family Labor Costs}}{\text{Average Annual Per Employee Construction Wage}} = \frac{\$170,850,000}{\$12,557} = 13,606$$

Multi-Family Construction Employment = 850

$$\frac{\text{Total Multi-Family Construction Person-Years}}{\text{Development Time Frame}} = \frac{13,606}{16 \text{ yrs.}} = 850$$

d. Guest Lodging - Total Development Costs = \$4,031,250

Average Size of Rooms	x	Price per Square Foot	x	Number of Rooms
375 square feet	x	\$43	x	250
= Total Development Costs				
= \$4,031,250				

Estimated Labor Share of Total Construction Cost = 40%
 Total Hotel Labor Costs = \$1,612,500

Total Development Costs	\$4,031,250
Estimated Labor Share of	
Total Construction Costs	.40
TOTAL	<u>\$1,612,500</u>

Average Annual Per Employee Construction Wage = \$12,557
 Total Hotel Construction Person-Years = 128

<u>Total Hotel Labor Costs</u>	=	<u>\$1,612,500</u>	=	128
Average Annual Per Employee Construction Wage		\$12,557		

Hotel Construction Employment = 8

<u>Total Hotel Construction Person-Years</u>	=	<u>128</u>	=	8
Development Time Frame		16 yrs.		

Total Residential Construction Employment = 1,054

Appendix A.9

Method to Calculate Commercial Construction Employment

a. Retail - Total Development Costs

Number of Retail Square Feet	x	Price per Square Foot	x	Total Development Costs
1,011,100	x	\$40	x	\$40,444,000

Estimated Labor Share of Total Construction Cost = 40%

Total Retail Labor Costs = \$16,177,600

Total Development Costs	\$40,444,000
Estimated Labor Share of Total Construction Costs	.40
TOTAL	<u>\$16,177,600</u>

Average Annual Per Employee Construction Wage = \$12,557

Total Retail Construction Person-Years = 1,288

$$\frac{\text{Total Retail Labor Costs}}{\text{Average Annual Per Employee Construction Wage}} = \frac{\$16,177,600}{\$12,557} = 1,288$$

Total Retail Employment = 80

$$\frac{\text{Total Retail Construction Person-Years}}{\text{Development Time Frame}} = \frac{1,288}{16 \text{ yrs.}} = 80$$

b. Retail (\$35) - Total Development Costs

Number of Retail Square Feet	x	Price per Square Foot	x	Total Development Costs
199,000	x	\$35	x	\$6,965,000

Estimated Labor Share of Total Construction Cost = 40%

Total Retail Labor Costs = \$2,786,000

Total Development Costs	\$6,965,000
Estimated Labor Share of Total Construction Costs	.40
TOTAL	<u>\$2,786,000</u>

Average Annual Per Employee Construction Wage = \$12,557

Total Retail Construction Person-Years = 222

$$\frac{\text{Total Retail Labor Costs}}{\text{Average Annual Per Employee Construction Wage}} = \frac{\$2,786,000}{\$12,557} = 222$$

Total Retail Construction Employment = 14

$$\frac{\text{Total Retail Construction Person-Years}}{\text{Development Time Frame}} = \frac{222}{16 \text{ yrs.}} = 14$$

c. Office - Total Development Costs

Total Square Feet Office Space	x	Price per Square Foot	x	Total Development Costs
486,900	x	\$45	x	\$21,910,500

Estimated Labor Share of Total Construction Cost = 40%

Total Office Labor Costs = \$8,764,200

Total Development Costs	\$21,910,500
Estimated Labor Share of	
Total Construction Costs	.40
TOTAL	<u>\$8,764,200</u>

Average Annual Per Employee Construction Wage = \$12,557

Total Retail Construction Person-Years = 698

$$\frac{\text{Total Office Labor Costs}}{\text{Average Annual Per Employee Construction Wage}} = \frac{\$8,764,200}{\$12,557} = 697.95$$

Total Office Employment = 44

$$\frac{\text{Total Office Construction Person-Years}}{\text{Development Time Frame}} = \frac{698}{16 \text{ yrs.}} = 44$$

Total Commercial Construction Employment = 138

Appendix A.10

Method to Calculate Short-Term Public Employment

a. Fire Facilities (2) - Total Development Costs = \$311,000

Estimated Labor Share of Total Construction Costs = 40%
 Total Fire Station Development Costs = \$124,400

Total Development Costs	\$311,000
Estimated Labor Share of Total Construction Costs	.40
TOTAL	<u>\$124,400</u>

Average Annual Per Employee Construction Wage = \$12,557
 Total Fire Facility Construction Person-Years = 10

$$\frac{\text{Total Fire Station Development Costs}}{\text{Average Annual Per Employee Construction Wage}} = \frac{\$124,400}{\$12,557} = 10$$

Total Retail Construction Employment = 10

$$\frac{\text{Total Fire Facility Construction Person-Years}}{\text{Development Time Frame}} = \frac{10}{1 \text{ yr.}} = 10$$

b. Elementary/Middle School - Total Development Costs = \$5,000,000

Estimated Labor Share of Total Construction Costs = 40%
 Total School Development Costs = \$2,000,000

Total Development Costs	\$5,000,000
Estimated Labor Share of Total Construction Costs	.40
TOTAL	<u>\$2,000,000</u>

Average Annual Per Employee Construction Wage = \$12,557
 Total School Construction Person-Years = 159

$$\frac{\text{Total School Development Costs}}{\text{Average Annual Per Employee Construction Wage}} = \frac{\$2,000,000}{\$12,557} = 159$$

Total School Construction Employment = 10

$$\frac{\text{Total School Construction Person-Years}}{\text{Development Time Frame}} = \frac{159}{3 \text{ yr.}} = 53$$

Appendix A.11

Method to Calculate 1999 Fire District Population

Hilton Head Island Estimated Population Year 2000	-	Annual Island Population Growth Rate 1990-2000	=	1999 Island Population
28,200	-	4.46%	=	26,942
1999 Island Population	x	Estimated Percentage of Island Population that will live within the Hilton Head Island Fire District in the next 10-15 years		Estimated 1999 District Population
26,942	x	.70	=	18,860

VITA

Ricky Lee Morris was born in Salisbury, Maryland on October 11, 1958. He attended elementary schools in Seaford, Delaware and was graduated from Seaford High School in June 1977. The following September he entered Salisbury State College, and in May 1981 he received a Bachelor of Science degree in Geography. In the fall of 1981 he entered The University of Tennessee, Knoxville and began study toward a Master's degree. This degree was awarded in August 1984.