IMPACT ASSESSMENT OF DELEP CCMP VERSUS STATUS QUO ON TWELVE MUNICIPALITIES IN THE DELEP REGION

DELEP REPORT #95-06 A

By

Rutgers University Center for Urban Policy
and Research

August 15, 1995

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LOCAL GOVERNMENTS COMMITTEE
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This report is printed on recycled paper.

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Contents

PART A

INTRODUCTION AND OVERVIEW

INTRODUCTION

The purpose of the study that follows is to view the differences in land taken, infrastructure provided, housing costs resulting, and fiscal impacts created by two different land development futures for twelve communities in the Delaware Estuary. These futures arise if the estuary develops as it has in the past or it develops according to the Delaware Estuary Program's Comprehensive Conservation Management Plan (CCMP).

One alternative future is current development trends extended into a twenty-five–year time horizon: it is called trend, or STATUS QUO. Development of this type would include subdivision-style residential development and strip nonresidential development consisting of skipped-over, noncontiguous land development including residential development in the form of 0.33 to 1.0 acre lots, and nonresidential development using floor-area ratios of 0.20 or less. Land development patterns such as these continue prior trends of agricultural and other frail land consumption, significant road/pavement construction, and high amounts of water and sewer infrastructure provision. This type of development has, in documented cases, contributed to both increased housing costs for new households and negative fiscal impacts to host public service jurisdictions.

Another future is the development patterns offered by the Delaware Estuary Program's Comprehensive Conservation and Management Plan—CCMP. This form of development seeks to contain most new growth around existing centers and to limit development in rural areas. It also seeks to save more prime agricultural and frail lands, prevent wetland encroachment, buffer streams and other water bodies, and protect open water and other habitats. It also seeks to reduce road construction and water/sewer infrastructure provision through more contained and, in some cases, mixed-use development. This would be done by increasing the density of development over conventional standards close in to existing development and by decreasing density substantially in the outer, more rural and undeveloped areas of the estuary. Density increases and decreases are handled in a way not to alter regional housing costs nor to increase the service outlays of public host service providers.

OVERVIEW

Following study designs used by Rutgers University or its researchers in the analyses of similar issues in the New Jersey State Development Plan, the Maryland Growth Management Act, and the Lexington, Kentucky Metropolitan Vision, four

different models are used to calculate the effects of these two different forms of development. These are:

1. a land consumption model;
2. an infrastructure model;
3. a housing cost model; and
4. a fiscal impact model.

Each of these models enables comparisons to be made on the land-use efficiency of one or the other development alternative.

Land Consumption Model

This model allows future projections of households and jobs to be converted to the demand for residential and nonresidential structures, and ultimately to the demand for residential and nonresidential land. Historical rates of farmland takings are applied to land consumed under the trend development future, and goals of farmland retention are applied under planned development. A similar procedure is used for frail land consumption comparisons. The model, using different densities, development locations, and housing types of trend (STATUS QUO) versus plan (CCMP), calculates the total agricultural and frail land consumed under each development alternative and expresses these, as well as their differences, in acres.

The Infrastructure Model

The infrastructure model relates development density and housing type to the demand for local/state roads and water/sewer infrastructure. In the first case, land consumed is directly correlated to lane-miles of road required for two-lane (local) and four-lane (state) roads. Usually there are significant differences in local road lane-miles necessary under trend versus planned development, but only small differences in state road lane-miles under one or the other scenario.

Housing type, and less so density, is related to the amount of water and sewer consumed (in gallons) by development. Usually these differences are small. Larger and more significant are differences observed in water/sewer infrastructure and costs. This relates to the number of required hookups (from the trunk line). A fraction of hookup costs is the amount that is presumed to be ongoing water and sewer operating costs. Thus, if hookups can be saved by clustering, mixed-use, and multifamily development, long-run operating costs also should be less.

The Housing Cost Model

The housing cost model factors in the land component of housing costs to allow housing price to rise or fall according to the amount of land included in the enhanced lot size areas of preservation zones. Thus, preservation efforts have the effect of raising regional housing costs if they are not counteracted by increases in density in areas that accommodate new development near already developed areas. The housing cost model uses existing housing price and the share of housing price that land represents and adjusts this value up or down according to the amount of land consumed for a housing lot. This is done for both developed and rural areas under both alternatives.

The Fiscal Impact Model

The fiscal impact model estimates the number of people, employees, and students that will be attracted by development under each of the development scenarios and projects their future costs versus revenues to host public service jurisdictions. While population and employment projections do not vary between alternatives at the county and estuary levels, at the municipal level there could be significant differences. In the planned development case, urban communities with slack service capacity receive more growth than rural areas with lesser amounts of public service infrastructure. Reduced infrastructure provision and potentially reduced annual maintenance on this infrastructure could lead to diminished fiscal impacts for this alternative.

USEFUL FINDINGS FOR THE FIELD

There have been repeated findings with regard to land, infrastructure, and housing cost savings in more-planned versus less-planned (trend or status quo) development futures. These savings are most obvious in locations that are rapidly growing and have had little or no land-use planning at municipal, county, or state levels. Most of these studies have used a prospective model so that potential savings reflect differences between a trend scenario unchanging into the future and a plan scenario that is basically adhered to over time.

The findings of these studies are causing a resurgence in "costs of sprawl" inquiries nationally and a significant revival of land-use management. Those involved in the National Estuary Program could benefit from understanding the cost savings likely to be uncovered here, for they are potentially applicable in other locations regardless of scale.

PART B

SUMMARY OF FINDINGS

SECTION I—GROWTH TRENDS AND PROJECTIONS

Delaware Estuary

- The Delaware Estuary Program study area consists of portions of three states (New Jersey, Pennsylvania, and Delaware), 22 counties, and over 500 municipalities. It has a total population of 6.3 million (1995) and a job base of more than 3.2 million (1995). Two-thirds of the population and jobs are in Pennsylvania, just under one-quarter in New Jersey, and 10 percent in Delaware.

- Over the period 1995 to 2020, the Delaware Estuary will grow by 591,000 in population and by 557,000 in jobs. The former represents an increment of 9.3 percent; the latter, an increment of 17.2 percent. More than half (55%) of the population growth will take place in New Jersey, 25 percent in Pennsylvania, and 20 percent in Delaware. With regard to employment growth, 90 percent will be divided almost equally between New Jersey and Pennsylvania, and the remaining 10 percent will take place in Delaware.

- Overall, in the estuary, Pennsylvania and New Jersey will constitute 90 percent of the population and employment growth and Delaware the remaining 10 percent. In terms of their own relative increases, the New Jersey and Delaware portions of the estuary will increase their populations by 20 percent; Pennsylvania will increase its population by 50 percent. As for employment in the estuary, New Jersey will increase its portion by 40 percent, Delaware by 20 percent, and Pennsylvania by 10 percent.

Study Communities

- Within the Delaware Estuary twelve communities were selected for study. Communities were chosen on the basis of state representation, levels of development, and rates of growth. These communities will grow by 7-10 percent of the Delaware Estuary Program study area growth and, in so doing, expand their collective bases by 20 percent. While these communities are individually representative of those found in the estuary, aggregate growth is a slice, but not necessarily a representative slice, of overall growth in the estuary.

- Communities are grouped below according to location and level of development criteria used by the Local Governments Committee of the Delaware Estuary Program. Criteria used to select study communities are covered in Section I.

- The communities chosen for study are as follows:

Urban	Suburban	Rural
Bridgeton City (NJ)*	West Deptford Township (NJ)	Chesterfield Township (NJ)
Pennsauken Township (PA)	Whitpain Township (PA)	Commercial Township (NJ) *
Chester City (PA)*	Central Pencader Div. (DE)	East Coventry Township (PA)
Bensalem Township (PA)		Smyrna Division (DE)
New Castle Division (DE)		

* Non-growth communities (either residential, nonresidential, or both).

SECTION II—STATUS QUO AND CCMP DEVELOPMENT ALTERNATIVES

- Trend development is historical development in an area. Nationally, the land-use literature describes this type of development as land-consumptive, inefficient in the use of available land at or near the core of the metropolitan area, and requiring significant accompanying infrastructure in the form of roads, water and sewer lines, public buildings, and the like.

- Planned or managed development attempts to direct growth to already existing locations of development while preserving yet-to-be-developed areas. Nationally, the land-use literature portrays planned development as more efficient in its land-use patterns and thus less land-consumptive. Accordingly, it usually requires somewhat less development infrastructure. Planned development is also viewed as not limiting or restricting population or employment growth at the county, regional, or state levels.

- Actual historical or STATUS QUO development in the Delaware Estuary is characterized by lower-density single-family development consuming land beyond areas already developed and, even more significantly, in skipped-over rural areas. Strip commercial development is also beginning to move to

the periphery of existing developed areas and beyond, along major thoroughfares, bypasses, and beltways.

- STATUS QUO development consumes significant amounts of agricultural and frail lands and provides few buffers for inclusive water bodies, frail environmental lands, and natural habitats.

- CCMP development in the Delaware Estuary seeks to contain more growth closer in to existing development; it offers a somewhat higher density, more diversity in housing types, and enhanced nonresidential development near existing development concentrations. This alternative preserves land from being consumed in peripheral areas via low density, supports the clustering of housing types, and promotes primarily convenience-goods nonresidential development in less-developed areas. Water bodies, frail environmental lands, and natural habitats are all adequately buffered from future development.

- CCMP development in the Delaware Estuary is likely to involve more planning and growth management and to take a more regional view toward the location of certain residential and nonresidential uses in sensitive development areas.

- CCMP development directs a certain portion of overall growth to central and developed political subdivisions experiencing decline and away from peripheral political subdivisions experiencing rapid growth. Because this affects all 500 communities in the estuary differently, *in the slice of development viewed by the study communities*[1], housing units increase and nonresidential units[2] decrease by about 1,100 each under the CCMP alternative.

SECTION III—THE POTENTIAL SAVINGS OF PLANNED VERSUS TRADITIONAL DEVELOPMENT: THE FINDINGS OF THE FIELD

- Fewer than ten studies nationally have attempted to document the specific benefits of planned development versus more traditional types of develop-

[1]This pertains just to the communities studied for this analysis; at the estuary level, growth is equal under the two alternative development scenarios.
[2]A nonresidential unit represents 1,000 square feet of commercial or industrial space.

ment. Findings have been in four primary areas: 1. *land savings;* 2. *infrastructure savings (roads, water, sewer, and public buildings);* 3. *housing cost reductions;* and 4. *fiscal impact cost reductions.*

- Developable land—and within it, lands that are devoted to prime agricultural uses and those that are environmentally fragile—can be saved under well-defined growth management approaches. In evaluating the potential impacts of a New Jersey State Development and Redevelopment Plan, a team of researchers found that planned development could save 43.5 percent of overall land consumed for development over a twenty-year growth horizon. Land saved from development in a Lexington, Kentucky, study was more than 25 percent for a similar period.

- Infrastructure savings related to planned growth have received even more attention. Studies undertaken in Florida, New Jersey, California, and Minnesota, and reported by three principal authors, indicate average savings of approximately 25 percent for roads, 5 percent for schools, and 15 percent for utilities.

- Housing costs as a result of planned growth have received mixed reviews. Where the number of housing units is actually limited through growth controls (Petaluma, California), housing costs rise; where no limit is imposed and density increases more than compensate for density decreases (New Jersey and Lexington, Kentucky), housing costs actually decline somewhat—about 5 percent. (This latter scenario holds for the Delaware Estuary.)

- Fiscal impacts related to alternative development patterns are less costly to municipalities and school districts by about 2 percent under planned development, according to the *Impact Assessment of the New Jersey State Development and Redevelopment Plan.*

SECTION IV—STATUS QUO VERSUS CCMP DEVELOPMENT IN THE DELAWARE ESTUARY REGION: DOES CCMP DEVELOPMENT PAY?

Land Consumption

- STATUS QUO versus CCMP development in the Delaware Estuary study communities would consume 15,955 acres versus 12,690 acres over the

twenty-five year growth period 1995-2020. Eighty-three percent of this land would be taken to accommodate residential development.

CCMP growth saves 3,265 acres of developable land.

- STATUS QUO versus CCMP development in the Delaware Estuary study communities over a twenty-five year growth period would consume 8,200 acres versus 5,850 acres of prime farmland.

  CCMP growth saves 2,350 acres of prime farmland.

- STATUS QUO versus CCMP development in the Delaware Estuary study communities over a twenty-five year growth period would consume 3,967 acres versus 2,892 acres of fragile environmental (frail) lands.

  CCMP growth saves 1,075 acres of frail environmental lands.

Infrastructure (Roads)

- STATUS QUO versus CCMP development in the Delaware Estuary study communities over a twenty-five year growth period would cause the construction of 293.6 lane-miles versus 236.4 lane-miles of *local* roads.

  CCMP growth saves 57.2 lane-miles of local roads.

- Related to this *local* road lane-mile savings is a construction cost savings of $28.8 million (regardless of who pays for local roads).

  CCMP growth saves $28.8 million in local road costs.

- STATUS QUO versus CCMP development in the Delaware Estuary study communities over a twenty-five year growth period would cause the construction or widening of 46.0 lane-miles versus 42.7 lane-miles of *state* roads.

  CCMP growth saves 3.3 lane-miles of state roads.

- Related to this state road lane-mile savings is a cost savings of $2.7 million.

  CCMP growth saves $2.7 million in state road costs.

Infrastructure (Water and Sewer)

- STATUS QUO versus CCMP development in the Delaware Estuary study communities over a twenty-five year growth period would require 28,600 versus nearly 27,000 water hookups. With hookups as a surrogate for annual water-system treatment and distribution costs, CCMP development would save 1,600 hookups and $9.1 million in water distribution costs.

  CCMP growth saves $9.1 million in annual treatment and distribution costs.

- Because eight percent fewer sewer hookups are required under this scenario, CCMP development saves $8.3 million more for ongoing sewer maintenance than STATUS QUO development.

  CCMP growth saves $8.3 million in annual sewer treatment and distribution costs.

Housing Costs

- Approximately 27,000 housing units will be built in the Delaware Estuary study communities over the twenty-five year development period 1995-2020. Those built near existing development—15,325 under CCMP versus 7,130 under STATUS QUO—will be built at a moderate *increase* in density. Those built peripherally to existing development, usually in rural areas (7,100 fewer under CCMP development), will be built at a more significant *decrease* in density.

  CCMP growth builds 8,200 more housing units near existing development and 7,100 less in peripheral or rural areas.

- Overall, under CCMP development housing costs will be 8.4 percent less: 19.3 percent less near areas of existing development and 13.8 percent more outside these areas in peripheral or rural areas.

  CCMP growth produces 8.4 percent overall lower housing costs than STATUS QUO.

Fiscal Impacts

Due to excess service capacity and servicing efficiencies of mature versus developing study communities of the Delaware Estuary, $12.7 million in annual local public-sector service costs can be saved under CCMP versus STATUS QUO growth. (This amounts to a cost savings of approximately 6.9 percent annually.) Of the $12.7 million annual saving, $9.9 million would be saved by school districts and $2.8 million would be saved by municipalities.

CCMP growth saves 6.9 percent in annual local public-sector service costs.

SUMMARY

Across the foregoing indices of measurement—land consumption, infrastructure requirements/costs, housing costs, and fiscal impacts—CCMP development occasions noticeable savings over STATUS QUO development. The savings noted parallel what has been found in the literature and pertain to most study communities of the Delaware Estuary.

Planned versus Trend Growth: Findings of the Field Nationally		**CCMP versus STATUS QUO Growth: Findings in the Delaware Estuary**	
Area of Impact	*Savings: Planned over Trend*	*Area of Impact*	*Savings: CCMP over STATUS QUO*
Developable Land	43.5%	Developable Land	20.5%
Infrastructure Roads (local) Utilities (water/sewer)	 25% 15%	Infrastructure Roads (local) Utilities (water/sewer) (hookups)	 19.7% 6.7%
Housing Costs	5%	Housing Costs	8.4%
Fiscal Impacts	2%	Fiscal Impacts	6.9%

Section I

GROWTH TRENDS AND PROJECTIONS IN THE DELAWARE ESTUARY AND STUDY COMMUNITIES IN NEW JERSEY, PENNSYLVANIA, AND DELAWARE

INTRODUCTION

The purpose of the following section is to discuss growth trends and projections for the Delaware Estuary and several study communities within it in New Jersey, Pennsylvania, and Delaware.

Statistics for both the Delaware Estuary as a whole and those for the individual study communities will be discussed in the same general format. Trends in population and household growth will be discussed first, followed by trends in total employment and employment by sector. These will be followed by projections of total employment and employment by growth sector, as well as similar projections for population and household growth.

This section of the study draws heavily on the work included in the Delaware Valley Regional Planning Commission's *Status and Trends of the Delaware Estuary Watershed,* a study undertaken for the Delaware Estuary Program [DELEP] (DVRPC, 1994c, 1994d). The statistical information prepared by Barry Seymour and staff as part of this project forms the foundation for much of this section. This information has been augmented by data contained in the Greeley-Polhemus (1991a, 1993) reports for DELEP and by other projections of population and employment from the New Jersey Department of Transportation and the Center for Applied Demography and Survey Research at the University of Delaware (NJDOT 1994a, 1994b; U DEL, 1994a, 1994b). Additional information on employment projections has been gleaned from data prepared by the New Castle County (DE) Planning Department (New Castle County 1994).

This section of the report serves as a backdrop for three other primary sections. Section II discusses the differences between trend (STATUS QUO) development and planned (CCMP) growth both generally and in the study municipalities of the Delaware Estuary. Section III summarizes the national literature on the land, infrastructure requirements, housing costs, and fiscal impacts of trend versus planned growth; Section IV calculates the potential effects of STATUS QUO versus CCMP growth on the study communities of the Delaware Estuary. Thus, this section of the report provides: (1) trends and projections of population and employment growth prior to other sections that deal with: (a) what trend and planned growth specifically are; (b) the land/infrastructure requirements and housing cost/fiscal effects of this growth; and (c) the specific impacts on the individual study communities of

the Delaware Estuary given locations of trend (STATUS QUO) and planned (CCMP) growth in these areas.

THE DELAWARE ESTUARY

The Delaware River Basin encompasses an area stretching from Delaware County, New York, south to Cape May, New Jersey, and Cape Henlopen, Delaware. The lower third of the basin, from Trenton, New Jersey, and Morrisville, Pennsylvania, south to the Jersey and Delaware capes, constitutes the Delaware Estuary Watershed (Figure 1). This region includes all of the territory in the three states that drains into the estuary including the 22 counties that border the estuary or drain into the estuary's tributaries. The Delaware Estuary in 1995 is home to nearly 6.4 million people and employs more than 3 million workers. It contains the fifth largest city in the United States and has the second largest concentration of petrochemical facilities in the country (Delaware Estuary Program 1995, 19–20).

Population, Household, and Employment Projections

Population

Population projections used in this study for New Jersey communities draw upon the New Jersey Department of Transportation (NJDOT) April 1994 projections. For Pennsylvania communities, the study uses the 1991 projections of the Pennsylvania Department of Environmental Resources† (PA DER 1991). For Delaware divisions, the study employs 1994 projections from the University of Delaware (U DEL 1994a), Center for Applied Demography and Research.

Households

Household projections used in this study draw upon the 1990 U.S. Census household count and are extended into the future by dividing projections of population by household size, and in so doing reducing 1990 household size by 7 percent, for the 30-year period 1990 to 2020.

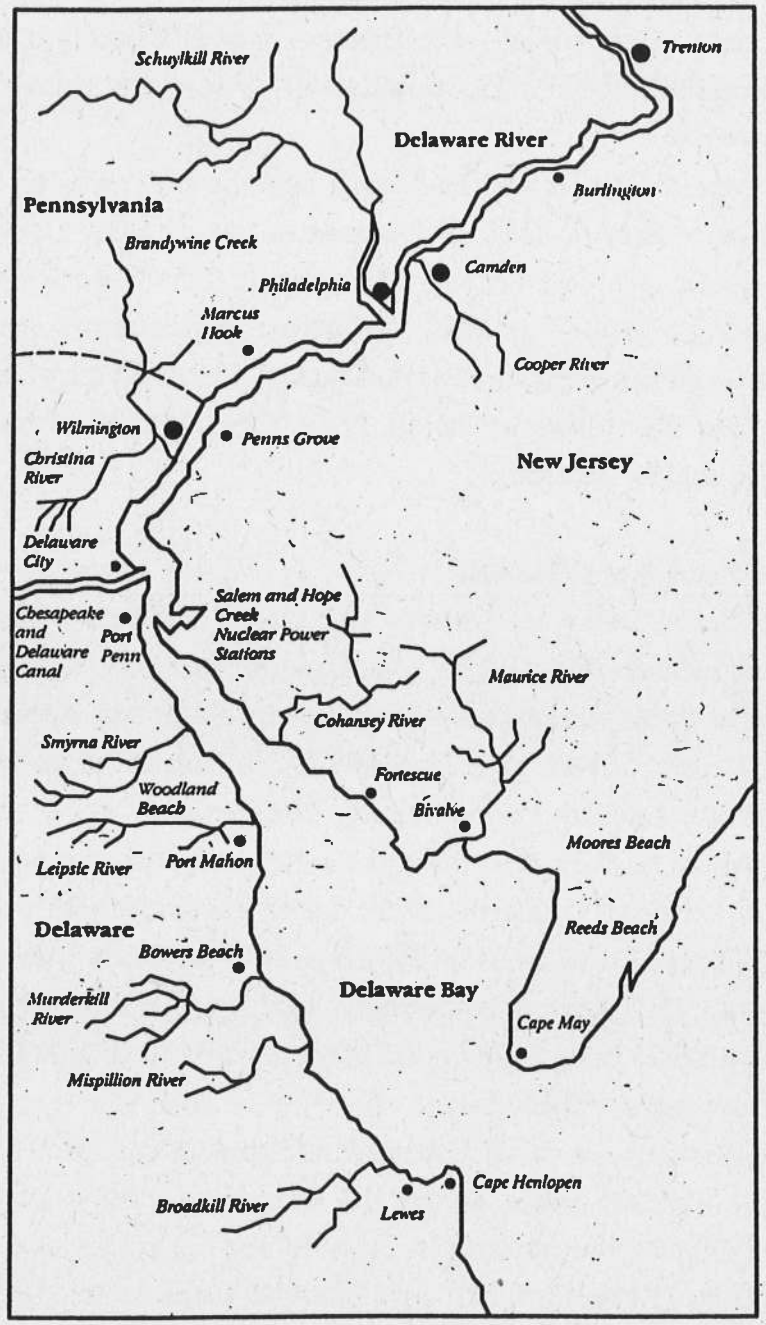
Employment

Employment projections used in this study for New Jersey communities use NJDOT April 1994 employment projections.

† On July 1, 1995, the Pennsylvania Department of Environmental Resources became the Pennsylvania Department of Environmental Protection. Citations throughout this report are to the Department's former name—Pennsylvania Department of Environmental Resources [PA DER].

FIGURE 1

The Delaware Estuary



Source: Delaware Estuary Program, 1993 Annual Report

For most of the Pennsylvania communities, the Delaware Valley Regional Planning Commission (DVRPC) projections are used but are adjusted by the ratio of PA DER to DVRPC population projections by community. For other Pennsylvania communities (in Berks, Schuylkill, Lehigh, and Lebanon counties), employment was projected using the 1990 base number as modified by the population growth of the municipality to its 1990 base population.

For Delaware communities in New Castle County, employment projections were available from U DEL. For communities in Kent County, the 1990 employment figure was projected into the future based on 1990–2020 population trends controlled in 2020 by Bureau of Economic Analysis (BEA) projections. For communities in Sussex County, the 1990 employment figure was projected into the future based on 1990–2020 population trends with no end-period BEA control available.

Population and Household Growth

As of 1995, the Delaware Estuary study area contains 6.3 million people and 2.4 million households (Table I-1). One-quarter of the population and households are in New Jersey, just under two-thirds are in Pennsylvania, and 10 percent are found in Delaware (Tables I-2, I-3, I-4). In terms of population, the region is dominated by Pennsylvania. The portions of three states (New Jersey, Pennsylvania, and Delaware) and twenty-two counties whose lands are in the Delaware Estuary will grow from 6.4 to 7.0 million in population and from 2.41 to 2.73 million in households from 1995 to 2020. This represents an increase of 9.3 and 13.1 percent, respectively (Table I-1). Of the estuary's 591,000 increase in population from 1995 to 2020, 55 percent or 325,000 is attributable to growth in New Jersey (Table I-4).

Household growth is distributed somewhat differently. Forty-three percent of the 315,000 increase in the estuary's households will be in Pennsylvania (136,000), 40 percent in New Jersey (122,000), and 17 percent in Delaware (57,000) (Tables I-3, I-2, I-4). Smaller household size of the population increase in Pennsylvania causes the juxtaposition between New Jersey and Pennsylvania in population and household growth.

TABLE I—1
Estuary Total:
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	6,215,184	6,363,784	6,757,799	6,954,852	394,016	6.2	197,053	2.9	591,069	9.3
HOUSEHOLDS	2,323,855	2,410,438	2,627,700	2,726,111	217,262	9.0	98,411	3.7	315,673	13.1
EMPLOYMENT	3,121,207	3,237,212	3,615,901	3,794,416	378,689	11.7	178,515	4.9	557,204	17.2
Agr. Services *	54,276	57,650	68,480	74,189	10,830	18.8	5,709	8.3	16,539	28.7
Construction *	200,972	206,122	222,028	227,572	15,905	7.7	5,545	2.5	21,450	10.4
Manufacturing	503,210	503,132	503,190	492,185	58	0.0	(11,005)	(2.2)	(10,947)	(2.2)
TCU	121,967	126,693	142,411	150,010	15,718	12.4	7,600	5.3	23,318	18.4
Wholesale	170,476	176,920	198,804	209,285	21,884	12.4	10,481	5.3	32,365	18.3
Retail	536,263	555,894	621,648	653,897	65,755	11.8	32,249	5.2	98,003	17.6
FIRE	274,255	284,211	314,980	329,043	30,769	10.8	14,063	4.5	44,833	15.8
Services	939,118	1,002,862	1,203,205	1,312,267	200,343	20.0	109,062	9.1	309,405	30.9
Governmental	320,671	323,729	341,156	345,966	17,427	5.4	4,810	1.4	22,237	6.9

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

TABLE I–2
New Jersey Watershed Communities:
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	1,486,201	1,555,531	1,763,520	1,880,892	207,989	13.4	117,372	6.7	325,361	20.9
HOUSEHOLDS	564,236	590,355	668,710	712,927	78,355	13.3	44,217	6.6	122,572	20.8
EMPLOYMENT	602,715	620,752	777,545	875,235	156,793	25.3	97,690	12.6	254,483	41.0
Agr. Services *	11,164	11,509	14,456	16,298	2,947	25.6	1,842	12.7	4,789	41.6
Construction *	34,727	34,960	41,009	44,349	6,050	17.3	3,340	8.1	9,390	26.9
Manufacturing	88,756	88,037	98,636	103,445	10,600	12.0	4,808	4.9	15,408	17.5
TCU	25,225	25,959	32,446	36,477	6,487	25.0	4,031	12.4	10,518	40.5
Wholesale	37,569	38,722	48,601	54,771	9,879	25.5	6,170	12.7	16,049	41.4
Retail	104,974	110,103	144,765	167,419	34,662	31.5	22,654	15.6	57,316	52.1
FIRE	44,007	45,127	55,847	62,422	10,720	23.8	6,574	11.8	17,295	38.3
Services	159,361	169,099	228,940	268,868	59,842	35.4	39,928	17.4	99,769	59.0
Governmental	96,932	97,236	112,842	121,185	15,607	16.1	8,342	7.4	23,949	24.6

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

TABLE I—3
Pennsylvania Watershed Communities: Population, Households and Employment Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	4,140,701	4,192,626	4,307,200	4,343,355	114,575	2.7	36,155	0.8	150,730	3.6
HOUSEHOLDS	1,541,639	1,588,598	1,692,216	1,724,914	103,618	6.5	32,698	1.9	136,316	8.6
EMPLOYMENT	2,197,076	2,280,962	2,466,060	2,524,470	185,099	8.1	58,410	2.4	243,508	10.7
Agr. Services *	39,562	42,273	49,239	52,506	6,966	16.5	3,268	6.6	10,234	24.2
Construction *	144,991	149,808	159,845	162,372	10,038	6.7	2,526	1.6	12,564	8.4
Manufacturing	360,042	360,088	348,954	333,234	(11,134)	(3.1)	(15,720)	(4.5)	(26,854)	(7.5)
TCU	82,976	86,374	94,063	96,695	7,689	8.9	2,632	2.8	10,321	11.9
Wholesale	121,953	126,709	137,285	140,710	10,575	8.3	3,426	2.5	14,001	11.0
Retail	381,085	393,044	417,305	422,651	24,261	6.2	5,347	1.3	29,608	7.5
FIRE	193,179	200,174	215,297	219,730	15,123	7.6	4,433	2.1	19,556	9.8
Services	696,843	744,324	866,218	923,282	121,893	16.4	57,065	6.6	178,958	24.0
Governmental	176,445	178,167	177,855	173,289	(312)	(0.2)	(4,566)	(2.6)	(4,879)	(2.7)

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

TABLE I—4
Delaware Watershed Communities: Population, Households and Employment Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	588,282	615,627	687,079	730,605	71,452	11.6	43,526	6.3	114,978	18.7
HOUSEHOLDS	217,980	231,485	266,774	288,270	35,288	15.2	21,496	8.1	56,785	24.5
EMPLOYMENT	321,416	335,498	372,296	394,711	36,797	11.0	22,415	6.0	59,213	17.6
Agr. Services *	3,551	3,868	4,785	5,384	917	23.7	600	12.5	1,516	39.2
Construction *	21,253	21,355	21,173	20,852	(182)	(0.9)	(322)	(1.5)	(504)	(2.4)
Manufacturing	54,412	55,008	55,600	55,506	592	1.1	(94)	(0.2)	498	0.9
TCU	13,767	14,359	15,901	16,838	1,542	10.7	937	5.9	2,479	17.3
Wholesale	10,953	11,488	12,918	13,803	1,430	12.4	885	6.9	2,315	20.1
Retail	50,204	52,747	59,579	63,827	6,831	13.0	4,249	7.1	11,080	21.0
FIRE	37,068	38,909	43,835	46,892	4,926	12.7	3,056	7.0	7,983	20.5
Services	82,914	89,438	108,046	120,117	18,608	20.8	12,070	11.2	30,678	34.3
Governmental	47,294	48,326	50,458	51,493	2,132	4.4	1,035	2.1	3,167	6.6

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

Employment Growth

Employment in the Delaware Estuary (at-place employment) is at a level of just under 3.24 million jobs in 1995. Approximately two-thirds of these jobs are in Pennsylvania (2.28 million), 21 percent (621,000) are in New Jersey, and 11 percent (335,500) are in Delaware (Tables I-2, I-3, I-4). Of existing employment, just under one-third is in services; retail trade and manufacturing split the second third; and government, FIRE*, construction, and wholesale divide the majority of the remaining third. Distributions are relatively similar within the three states with the exception that Pennsylvania shows much less of a government employment share, New Jersey relatively more wholesale employment, and Delaware significantly more manufacturing.

Employment growth in the estuary will amount to 557,000 jobs over the 25-year period 1995 to 2020. Half of this growth will be in the service industry, 20 percent in retail, 8 percent in FIRE, 10 percent each in wholesale/construction and TCU**/government employment, and the remaining 5 percent in agricultural services*** and manufacturing—combined (Table I-1).

Of the employment growth, New Jersey and Pennsylvania will share about 90 percent of the 557,000 growth (about 250,000 each) and Delaware will experience the remaining 10 percent (59,000). New Jersey will expand its employment base in the estuary at 2.5 times (41 percent) the rate of Delaware (18 percent) and four times the rate of Pennsylvania (11 percent) (Tables I-2, I-3, I-4).

COMMUNITIES FOR STUDY IN THE DELAWARE ESTUARY: REQUIREMENTS FOR SELECTION

In order to undertake the types of analyses described in the introduction and overview, twelve case-study cities had to be selected from the more than 500 municipal jurisdictions that exist in the estuary. This was done by establishing criteria for selection and allowing each of the communities to qualify on these selection criteria. This process is described below.

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* Finance, insurance, and real estate.
** Transportation, communication, and utilities.
*** Agricultural services, forestry, and fisheries.

Adequate Representation

The first selection criterion involved how many cities would be drawn from each state. An approximately even split was deemed to be appropriate in selecting cities from the three states. This was justified on the basis that Pennsylvania has the largest population and employment base in the estuary, New Jersey will experience the highest combined absolute population and employment growth, and Delaware will undergo the greatest relative household or housing demand increase.

Urban-Suburban-Rural

The second criterion involved a distribution of communities according to existing levels of residential and nonresidential development. Urban communities that are mostly developed but are still growing in population and employment provide an excellent laboratory to view differences between trend and planned growth on their land, infrastructure, housing cost, and fiscal futures. Concentrated development, usually associated with planned development, enables the greatest chance for using the slack capacity of an existing public service provider; sprawl growth, usually associated with trend development, often requires new service subcenters to be completed that may be costly and inefficient.

Suburban and rural growth communities offer an even more appropriate setting to view the effects of land-use pattern changes on the requirements for land and infrastructure and, as well, on housing and public service costs. Suburban centers and rural preservation areas are host to different types and amounts of growth and have different costs to service this growth than if development occurs homogeneously throughout the community.

Municipal Selection Criteria

Adequate Representation—3-5 municipalities per state

	Development and Growth	
Urban		
	Population Size	>25,000
	Population and/or Employment Growth	>5%
	Density	>2,000 persons/mi.^{2}
Suburban		
	Population Size	12,000-25,000
	Population and/or Employment Growth	>15%
	Density	500-2,000 persons/mi.^{2}
Rural		
	Population Size	2,500-12,000
	Population and/or Employment Growth	>20%
	Density	<500 persons/mi.^{2}

Growth—Non Growth

A final selection criterion involved the past and future growth activity of a community. Those locations that have the greatest land/infrastructure/housing cost/fiscal concerns about growth are usually the locations that are growing most significantly. A community that is growing slowly or even declining is clearly less concerned about the effects of growth on land availability, infrastructure provision, housing costs, or the ability to provide adequate public services. In slow growth or declining communities there is usually excess capacity in capital facilities/operational services to answer future public infrastructure and service needs. Nonetheless, no growth communities serve an important role in this type of study. They function as locations where some small proportion of growth can be redirected to bolster the economies of these areas and simultaneously take the growth pressure off other areas in the region.

SELECTED COMMUNITIES IN THE DELAWARE ESTUARY

Using the criteria previously discussed, twelve communities were selected for the study of different land-use patterns and their impacts on the costs of growth in the Delaware Estuary. As indicated, selection criteria included a combination of: (1) adequate representation from each of the three states; (2) a distribution of urban, suburban, and rural communities within each state; and (3) although most would be characterized by population and/or employment growth, there should be represented some communities that are not growing. Communities selected by individual criterion are:

SELECTED CITIES

Adequate Representation	New Jersey	Pennsylvania	Delaware
	Bridgeton City	Bensalem Township	Central Pencader Division
	Chesterfield Township	Chester City	New Castle Division
	Commercial Township	East Coventry Township	Smyrna Division
	Pennsauken Township	Whitpain Township	
	West Deptford Township		
Urban, Suburban, Rural	Urban	Suburban	Rural
	Bridgeton City (NJ)	West Deptford Township (NJ)	Chesterfield Township (NJ)
	Pennsauken Township (NJ)	Whitpain Township (PA)	Commercial Township (NJ)
	Chester City (PA)	Central Pencader Division (DE)	East Coventry Township (PA)
	Bensalem Township (PA)		Smyrna Division (DE)
	New Castle Division (DE)		
Growth/Non-Growth	Growth	Non-Growth	
	All of the Above Except Non-Growth Municipal Jurisdictions	Bridgeton City (NJ)	
		Chester City (PA)	
		Commercial Township (NJ)	

NEW JERSEY STUDY COMMUNITIES IN THE DELAWARE ESTUARY

Bridgeton City

Bridgeton City, Cumberland County, is a city of 19,000 population with an employment base of 10,250 (Table I-5). It is 6.2 square miles in land area, of which 85 percent is developed and 15 percent is vacant or wooded. Bridgeton

TABLE I—5
Bridgeton City (NJ):
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	18,942	19,121	19,659	19,533	538	2.8	(126)	(0.6)	412	2.2
HOUSEHOLDS	6,725	6,858	7,275	7,369	416	6.1	94	1.3	510	7.4
EMPLOYMENT	10,552	10,255	11,147	11,207	892	8.7	60	0.5	952	9.3
Agr. Services *	136	136	137	137	1	0.9	0	0.1	1	0.9
Construction *	560	559	561	561	1	0.2	0	0.0	1	0.2
Manufacturing	1,648	1,589	1,767	1,779	178	11.2	12	0.7	190	12.0
TCU	616	615	617	617	2	0.3	0	0.0	2	0.4
Wholesale	435	431	444	445	13	3.0	1	0.2	14	3.2
Retail	1,605	1,582	1,651	1,656	69	4.4	5	0.3	74	4.7
FIRE	471	471	472	472	1	0.3	0	0.0	1	0.3
Services	3,889	3,860	3,947	3,953	87	2.3	6	0.1	93	2.4
Governmental	1,192	1,012	1,552	1,588	540	53.3	36	2.3	576	56.9

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

is an older, developed, regional employment center whose manufacturing and retail/service bases are changing significantly, even though overall employment and population have remained basically stable since 1980. Median annual household income in Bridgeton was just under $20,000 in 1990; median housing value was about $53,500.

Bridgeton's housing stock is one of the oldest in the region (40 percent built before 1940) and is primarily (70 percent) single-family detached and attached on 50' x 100' lots. Some of the housing stock is in disrepair; remarkably little of it is abandoned.

Seventy percent of Bridgeton's current employment base is divided almost equally between services (3,860) and a combination of retail/manufacturing (3,170). The only other large category of employment in Bridgeton is governmental employment (1,010).

Population and Household Growth

The City of Bridgeton's population will increase by 400 or 2 percent to the 19,500 level over the next 25 years, whereas households will increase by 510, or 7.4 percent.

Employment Growth

Employment in the City of Bridgeton will increase by 1,000 or nearly 10 percent over the next 25 years. This will be made up of increases in employment related to a new state corrections facility to be built there.

Chesterfield Town

Chesterfield Township is a working rural New Jersey community in Burlington County. It has a 1995 population of 5,700, an employment base of 1,120, and is 22 square miles in size (Table I-6). Ninety percent of the township's land area is undeveloped. The areas that are developed are in the north-central portion around Crosswicks Village and the northwest portion around the state youth corrections facility (Yardville). Median housing value in Chesterfield Township in 1990 was $184,500; median annual household income, $53,500.

TABLE I—6
Chesterfield Township (NJ):
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	5,152	5,667	7,210	10,402	1,544	27.2	3,192	44.3	4,736	83.6
HOUSEHOLDS	945	1,051	1,334	1,883	284	27.0	548	41.1	832	79.1
EMPLOYMENT	1,133	1,117	2,978	6,266	1,861	166.6	3,287	110.4	5,148	460.8
Agr. Services *	176	173	501	1,081	328	189.3	580	115.6	908	523.8
Construction *	167	166	253	407	87	52.2	153	60.6	240	144.5
Manufacturing	176	176	187	208	11	6.5	20	10.8	32	18.1
TCU	122	120	315	659	195	161.9	344	109.2	538	447.9
Wholesale	95	95	108	133	14	14.5	24	22.3	38	40.1
Retail	23	22	101	239	79	359.0	139	138.2	218	993.1
FIRE	23	22	87	202	65	295.0	115	131.9	180	816.1
Services	289	280	1,368	3,290	1,088	389.0	1,922	140.5	3,010	10.6X
Governmental	63	63	58	48	(5)	(8.6)	(10)	(16.6)	(15)	(23.8)

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

The township's housing stock is a mixture of both old and new but is 93 percent single-family construction on large lots. Most housing outside the village areas is "piano key" development along county roads, with working farms to the rear of these elogated properties. Housing condition townwide is excellent, and vacancy is very low.

Chesterfield Township's employment base is distributed among services, farming, manufacturing, and construction.

Population and Household Growth

Chesterfield Township's population and households will almost double over the next 25 years. Population will increase by 4,700; households will increase by 830.

Employment Growth

Employment is projected to increase by nearly fivefold, or 5,150 jobs, from 1995-2020. This is likely to take place in the northwestern portion of the township in industrial parks planned for the area and also as an outgrowth of the commercial area around Crosswicks Village in the north-central portion of the community. In the first case, this will be TCU, farm services, and construction employment; in the second it will be jobs in business services, retail, and FIRE.

COMMERCIAL TOWNSHIP

Commercial Township is a rural community in Cumberland County of 5,400 in population and 600 in employment (Table I-7). It is 32.5 square miles in size, of which 75 percent is vacant or wooded. Commercial Township once had significant marine-oriented businesses which have since closed. Several mining, small manufacturing, and minor service industries remain. The community's old retail strip in Port Norris is receding, but there is some development in the northeastern part of the township and in the central portion, westward from Mauricetown towards Haleyville. Median housing value in Commercial Township in 1990 was approximately $50,900; median annual income, $20,000.

TABLE I–7
Commercial Township (NJ):
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	5,026	5,417	6,590	7,072	1,173	21.7	482	7.3	1,655	30.6
HOUSEHOLDS	1,741	1,897	2,328	2,526	432	22.7	197	8.5	629	33.1
EMPLOYMENT	616	607	645	639	39	6.4	(7)	(1.0)	32	5.3
Agr. Services *	13	13	13	13	0	3.2	(0)	(0.5)	0	2.7
Construction *	70	70	70	70	0	0.1	(0)	(0.0)	0	0.1
Manufacturing	101	103	95	96	(8)	(7.9)	1	1.4	(7)	(6.6)
TCU	45	44	45	45	1	1.3	(0)	(0.2)	0	1.1
Wholesale	40	39	43	43	4	11.2	(1)	(1.7)	4	9.4
Retail	65	62	73	71	10	16.6	(2)	(2.3)	9	13.9
FIRE	32	33	32	32	(0)	(1.1)	0	0.2	(0)	(0.9)
Services	179	171	201	196	30	17.4	(5)	(2.4)	25	14.5
Governmental	71	71	72	72	1	1.3	(0)	(0.2)	1	1.1

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

Commercial Township's housing stock is single-family, ranch-style (60 percent), much of which has been built simultaneously with modular housing (30 percent), which is permitted in all residential zones of the township. Some of the housing stock in Port Norris requires rehabilitation; however, the stock around Mauricetown is solid and relatively expensive. The Laurel Lakes portion of the community includes small houses on small lots, many of which are modular homes. Almost all of the township is single-family housing, either stick-built or modular.

Commercial Township's current employment is primarily marine and business services, with some low-level manufacturing and sand mining.

Population and Household Growth

Commercial Township's population is projected to grow by 30 percent or 1,650 over the period 1995 to 2020; households will grow by 33 percent or 630.

Employment Growth

There will be a small amount of growth in employment (5 percent) over the upcoming 25-year period in this township. Some growth in services and wholesale/retail trade will be somewhat offset by small declines in manufacturing.

Pennsauken Township

Pennsauken Township is a regional distribution center in Camden County of 35,000 population and 30,000 jobs (Table I-8). Pennsauken is 10.5 square miles in size, of which 85 percent is developed. Industry and commercial uses in the form of industrial parks, warehousing, and strip development occupy more than half the township's land; residential uses of single-family homes on small lots occupy another 35 percent. One-quarter of the township's housing stock—70 percent single-family detached and 10 percent single-family attached—is more than 50 years old. Median housing value was about $91,000 in 1990; median annual income, just over $36,000.

Of the township's 30,000 job base, 8,400 or 28 percent is composed of manufacturing, 6,800 or 23 percent is in services, 8,500 or 28 percent is in the wholesale/retail trades, and another 5,000 is spread among the TCU, FIRE, and construction industries.

TABLE I—8
Pennsauken Township (NJ):
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	34,738	35,043	35,955	37,447	913	2.6	1,492	4.1	2,405	6.9
HOUSEHOLDS	12,406	12,644	13,339	14,027	695	5.5	688	5.2	1,383	10.9
EMPLOYMENT	28,174	29,909	37,384	39,618	7,474	25.0	2,234	6.0	9,708	32.5
Agr. Services *	198	229	365	406	136	59.2	41	11.1	176	76.9
Construction *	1,395	1,415	1,503	1,530	88	6.2	26	1.8	115	8.1
Manufacturing	8,462	8,446	8,374	8,353	(71)	(0.8)	(21)	(0.3)	(93)	(1.1)
TCU	2,200	2,461	3,584	3,919	1,123	45.6	336	9.4	1,458	59.3
Wholesale	3,343	3,664	5,046	5,459	1,381	37.7	413	8.2	1,794	49.0
Retail	4,475	4,788	6,134	6,537	1,346	28.1	402	6.6	1,749	36.5
FIRE	1,496	1,560	1,834	1,915	274	17.5	82	4.5	356	22.8
Services	6,089	6,823	9,987	10,932	3,163	46.4	946	9.5	4,109	60.2
Governmental	515	523	557	567	34	6.5	10	1.8	44	8.4

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

Population and Household Growth

In Pennsauken Township population will grow by 2,400 or 7 percent over the period 1995-2020; households will grow by 1,380 or 11 percent over this period.

Employment Growth

Employment will grow by more than one-third or 9,700 jobs during the period 1995 to 2020. More than 4,100 of this job growth will be in the services industry; another 5,000 will be almost equally distributed among the retail, wholesale, and TCU industries.

West Deptford Township

West Deptford is a suburban New Jersey township of 21,000 population with a job base of 5,000 (Table I-9). It is sixteen square miles in size, of which two-thirds of the township is vacant or wooded. The majority (60 percent) of the housing stock of West Deptford Township is single-family detached, and another 25 percent is multifamily. Less than 9 percent of this housing was built before 1940. Median annual income in the township in 1990 was $38,400; median housing value, $101,300.

By far the largest sector of employment locally is manufacturing. This industrial sector comprises 2,000 jobs or 40 percent of the job base. Services amount to another 1,000 jobs, as does the combination of employment in the retail and wholesale industries. Two-thirds of the remaining 1,000 jobs are divided 60/40 between the TCU and construction industries.

Population and Household Growth

Population in West Deptford Township will increase by nearly one-third or 6,300; households will increase by close to 30 percent or 2,300. The spread between population and household growth is relatively large, indicating a growth in large family households and only small decreases in overall household size.

TABLE I—9
West Deptford Township (NJ):
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	19,380	20,867	25,326	27,198	4,460	21.4	1,872	7.4	6,332	30.3
HOUSEHOLDS	7,407	8,062	9,624	10,350	1,562	19.4	726	7.5	2,288	28.4
EMPLOYMENT	4,736	4,897	6,240	7,160	1,343	27.4	921	14.8	2,264	46.2
Agr. Services *	74	79	118	144	39	49.6	27	22.6	66	83.4
Construction *	280	276	242	218	(35)	(12.5)	(24)	(9.7)	(58)	(21.0)
Manufacturing	1,987	1,940	1,543	1,272	(397)	(20.5)	(270)	(17.5)	(667)	(34.4)
TCU	375	368	313	276	(55)	(14.9)	(37)	(11.9)	(92)	(25.0)
Wholesale	441	475	758	951	283	59.6	193	25.4	476	100.3
Retail	426	471	849	1,107	378	80.2	257	30.3	635	134.8
FIRE	138	139	141	142	2	1.6	2	1.1	4	2.7
Services	911	1,046	2,179	2,951	1,133	108.3	772	35.4	1,905	182.1
Governmental	103	103	100	97	(3)	(3.1)	(2)	(2.2)	(5)	(5.2)

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

Employment Growth

Employment will increase by nearly one-half or 2,260 jobs over the period 1995-2020. Two-thirds of the net growth will be in services (1,900 jobs); the remaining one-third (1,100 jobs) will be in the retail/wholesale industries. There will be a significant loss in manufacturing (close to one-third of the existing base—700 jobs) and smaller job losses in construction (60) and TCU (90) industries.

PENNSYLVANIA STUDY COMMUNITIES IN THE DELAWARE ESTUARY

Bensalem Township

Bensalem is a large, middle-class Pennsylvania township in Bucks County that has a population of 60,000 and an employment base close to 35,000 (Table I-10). The township is 20 square miles in size, of which three-quarters is developed.

Bensalem's housing stock is a mixture of single- (40 percent) and multi-family (35 percent) units, 95 percent of which were built after 1940. Median value of the housing stock in 1990 was $117,400; median annual income of residents was $38,500.

Bensalem's job base, as of 1995, is comprised of services (30%), retail (21%), manufacturing (19%), wholesale/FIRE (17%), and TCU/construction (11%) industries.

Population and Household Growth

Population in Bensalem Township is projected to grow by 7 percent, or nearly 4,000, from 1995 to 2020; households will grow by 11 percent, or 2,300.

Employment Growth

Employment growth will expand the job base of this municipality by one-quarter from 1995-2020. Jobs will grow by more than 8,300 during the period, two-thirds of which will be in the services industry. Eighty-five percent of the remaining 3,000 job growth will be split relatively evenly between retail and wholesale jobs.

TABLE I—10
Bensalem Township (PA):
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	56,788	59,067	63,429	62,940	4,363	7.4	(489)	(0.8)	3,874	6.6
HOUSEHOLDS	20,964	22,036	24,096	24,361	2,060	9.3	265	1.1	2,325	10.6
EMPLOYMENT	33,385	34,745	40,271	43,080	5,527	15.9	2,809	7.0	8,335	24.0
Agr. Services *	263	291	404	461	113	38.7	57	14.2	170	58.4
Construction *	1,801	1,819	1,890	1,926	71	3.9	36	1.9	108	5.9
Manufacturing	6,486	6,437	6,235	6,132	(202)	(3.1)	(102)	(1.6)	(304)	(4.7)
TCU	1,893	1,925	2,056	2,122	131	6.8	66	3.2	197	10.2
Wholesale	3,307	3,483	4,198	4,562	715	20.5	363	8.7	1,079	31.0
Retail	7,088	7,312	8,223	8,685	910	12.5	462	5.6	1,373	18.8
FIRE	2,412	2,442	2,567	2,630	124	5.1	63	2.5	187	7.7
Services	9,634	10,534	14,193	16,051	3,659	34.7	1,859	13.1	5,518	52.4
Governmental	501	502	508	511	5	1.1	3	0.5	8	1.6

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

CHESTER CITY

Chester City is a declining city in Delaware County, about five square miles in size, 98 percent of which is developed. The city, once a center of manufacturing during World War I, is now losing both population and employment. Population and employment declined about 10 percent each from 1980 to 1990 and at a similar rate since that time to current levels of about 40,000 and 13,300, respectively (Table I-11). There are approximately 13,700 households in the city of Chester as of 1995, and these too have been in decline since 1980.

Nearly 80 percent of the housing in the city of Chester is either single-family attached (64 percent) or 2- to 4-family units (15 percent). Forty percent of the housing stock was constructed before 1940; much of it exhibits abandonment, vacancy, or significant decay. Median housing value in Chester City in 1990 was $38,400; median annual income of householders was $16,000. The one remaining solid area of Chester is the area around Widener College, formerly the site of the Pennsylvania Military College.

The downtown of Chester City is badly deteriorated, with obviously high commercial vacancy and structure abandonment. The employment in Chester City is 40 percent services (5,100 jobs), 22 percent manufacturing (2,900 jobs), 10 percent retailing (1,200 jobs), 8 percent each TCU and construction (1,000 jobs), and 4–5 percent each—wholesale, FIRE, and government (600-700 jobs).

Population and Household Growth

Population in Chester City will decline by 7,400 or 19 percent from 1995-2020; households will decline by 1,860, or 13.5 percent. The large difference between population and household decline indicates that household size will continue to shrink citywide; there will also be a loss of family households in the city.

Employment Growth

Employment will decrease by about 30 jobs over the period 1995-2020 although interim periods (2005, 2010, and so on) will witness severe losses. All job sectors will lose initially, but the most significant initial loss will be in

TABLE I—11
Chester City (PA):
Population, Households, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	41,856	39,280	32,988	31,901	(6,292)	(16.0)	(1,087)	(3.3)	(7,379)	(18.8)
HOUSEHOLDS	14,537	13,772	12,058	11,912	(1,714)	(12.4)	(147)	(1.2)	(1,861)	(13.5)
EMPLOYMENT	14,765	13,271	11,395	13,242	(1,877)	(14.1)	1,847	16.2	(29)	(0.2)
Agr. Services *	82	67	49	67	(18)	(27.3)	18	36.9	(0)	(0.4)
Construction *	1,034	997	951	996	(46)	(4.6)	45	4.8	(1)	(0.1)
Manufacturing	3,170	2,909	2,582	2,904	(328)	(11.3)	322	12.5	(5)	(0.2)
TCU	960	944	923	943	(20)	(2.1)	20	2.2	(0)	(0.0)
Wholesale	605	548	476	546	(72)	(13.1)	71	14.8	(1)	(0.2)
Retail	1,336	1,243	1,127	1,241	(117)	(9.4)	115	10.2	(2)	(0.2)
FIRE	710	699	684	698	(15)	(2.1)	14	2.1	(0)	(0.0)
Services	6,118	5,128	3,885	5,108	(1,243)	(24.2)	1,223	31.5	(20)	(0.4)
Governmental	750	737	720	737	(17)	(2.2)	16	2.3	(0)	(0.0)

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

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the services industry. At one-quarter of this level will be job losses in the manufacturing sector. After 2010, increases will take place across most sectors of the economy to dampen 1995–2010 losses.

East Coventry Township

East Coventry Township is a rural, upper-middle–class Pennsylvania community in Chester County of nearly eleven square miles, of which 60 percent is vacant or wooded. East Coventry is viewed as part of the next suburban ring to be consumed by outward development from the core of Philadelphia. East Coventry has a population of 4,600 and a job base of 400 (Table I-12). Population and employment grew by 10 percent each from 1980 to 1990. Most (83 percent) of the housing stock in East Coventry is single-family homes on very large lots. There is also a representation of modular housing in the community (10 percent). Some of the housing stock is old, 20 percent more than 50 years of age; yet almost all is well-maintained and situated on spacious lots. Median house value was over $140,000 in 1990; median annual income of residents was about $43,400.

Two-thirds of the 400 employed in East Coventry Township are involved in manufacturing, farming/farm services, and retailing. The remainder is distributed at very low levels throughout the other major employment categories.

Population and Household Growth

Population will grow by 400 persons, or 9 percent, over the upcoming 25 years; households will grow by 200, or 13 percent. This may well be an underestimation of future growth here, as this community is in the path of growth and offers a high quality of life.

Employment Growth

The employment base of East Coventry will expand by 110, or 27 percent, over the next 25 years. Employment growth will be in agricultural services (60 percent), personal/business services (110 percent), and in the retail/wholesale industries (33 percent). There will also be a loss in the community's manufacturing base of about one-third the level of current employment in this sector.

TABLE I—12
East Coventry Township (PA):
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	4,450	4,635	4,995	5,043	360	7.8	48	1.0	408	8.8
HOUSEHOLDS	1,527	1,607	1,763	1,808	156	9.7	45	2.5	200	12.5
EMPLOYMENT	409	409	389	518	(20)	(4.8)	129	33.2	109	26.8
Agr. Services *	79	79	71	127	(9)	(10.8)	56	79.5	48	60.1
Construction *	15	15	12	26	(2)	(14.6)	14	112.3	12	81.3
Manufacturing	122	122	130	80	8	6.2	(50)	(38.5)	(42)	(34.7)
TCU	15	15	14	20	(1)	(7.0)	7	49.3	6	38.9
Wholesale	27	27	24	46	(3)	(12.5)	22	93.9	19	69.6
Retail	75	75	72	90	(3)	(3.7)	18	25.2	15	20.6
FIRE	24	24	21	41	(3)	(12.7)	20	95.1	17	70.4
Services	33	33	26	69	(7)	(20.0)	43	164.4	37	111.5
Governmental	19	19	20	18	0	1.1	(1)	(7.3)	(1)	(6.2)

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

Whitpain Township

Whitpain Township is a relatively upscale suburban center in Montgomery County with equivalent population and employment bases of approximately 17,500 (Table I-13). The township is thirteen square miles, of which eleven (88 percent) are developed. The township contains predominantly single-family homes (65 percent), many on estate-sized lots, but with some representation of both single-family attached (20 percent) and multi-family (12 percent) housing. The housing stock overall is in good to excellent condition. Median housing value in the township in 1990 was $213,500; median income was just under $61,000 annually.

The employment base of Whitpain Township is one-third manufacturing (5,700), one-quarter services (4,500), 16 percent FIRE (2,800), and 17 percent construction/retail (3,000).

Population and Household Growth

Population will grow by about 6,500 from 1995-2020, or by 37 percent; households will grow by 2,200, or 37 percent. The relationship between population and household growth indicates a future household size of about 2.3, which is average for this type of suburban community during this time period.

Employment Growth

Employment in Whitpain Township will increase by 9 percent, or about 1,550, over the 25-year period. Half of the growth will be in services and one-quarter in FIRE, with the remaining quarter divided among the construction, retail, and TCU industries.

TABLE I—13
Whitpain Township (PA):
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	15,673	17,483	22,208	23,920	4,726	27.0	1,712	7.7	6,438	36.8
HOUSEHOLDS	5,439	6,135	7,723	8,377	1,588	25.9	653	8.5	2,241	36.5
EMPLOYMENT	17,316	17,567	18,572	19,114	1,004	5.7	542	2.9	1,547	8.8
Agr. Services *	116	122	145	158	23	19.0	13	8.6	36	29.2
Construction *	1,628	1,662	1,797	1,869	135	8.1	73	4.0	207	12.5
Manufacturing	5,766	5,718	5,523	5,418	(195)	(3.4)	(105)	(1.9)	(300)	(5.2)
TCU	367	383	445	478	62	16.2	33	7.5	95	24.9
Wholesale	718	726	758	776	33	4.5	18	2.3	50	6.9
Retail	1,304	1,321	1,388	1,424	67	5.1	36	2.6	103	7.8
FIRE	2,742	2,808	3,075	3,219	267	9.5	144	4.7	411	14.6
Services	4,393	4,546	5,160	5,490	613	13.5	331	6.4	944	20.8
Governmental	282	282	281	281	(0)	(0.1)	(0)	(0.0)	(0)	(0.1)

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

DELAWARE STUDY COMMUNITIES IN THE DELAWARE ESTUARY

Central Pencader Division

The Central Pencader Division is a U.S. Census-recognized statistical declension in New Castle County, Delaware, encompassing the places of Glasgow, Keeney, Porter, and other unincorporated areas. It is 32 square miles in size, of which about one-half is developed. The Central Pencader Division is bisected by U.S. 40, which was once the Delaware commercial through route before Interstate 95. Development has sprung up both north and south of this roadway. The Central Pencader Division has a 1995 population of 23,500 and doubled in size from 1980 to 1990. It has a current employment base of 2,900 (Table I-14).

The housing stock of Central Pencader, mostly all of which is new, is a mixture of single-family detached (55 percent), single-family attached (18 percent), multifamily (17 percent), and modular (10 percent) units. Single-family lot size ranges from 100' x 100' to one-quarter–acre lots. Median house value in this division in 1990 was $127,500; median annual household income of residents, $44,500.

The employment base of the division is composed of industrial sectors as follows: one-third services, one-third manufacturing/retail, and one-third construction, TCU, and wholesale employment.

Population and Household Growth

Population in the Central Pencader Division will grow by a factor of one and one-third (31,000 persons) over the period 1995 to 2020. Households will grow by 120 percent, or by 10,000. The relationship between population and household growth indicates growth of family households and little shrinkage in household size over the next 25 years.

Employment Growth

Employment will increase in Central Pencader by more than 30 percent, or just over 900 employees, between 1995 and 2025. Given a projected population growth of 31,000, the employment projection could easily be a significant understatement of actual job growth likely to take place. Seventy

TABLE I—14
Central Pencader Division (DE): Population, Households and Employment Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	17,719	23,574	42,475	54,687	18,901	80.2	12,212	28.8	31,113	132.0
HOUSEHOLDS	6,164	8,305	14,283	18,327	5,978	72.0	4,043	28.3	10,021	120.7
EMPLOYMENT	2,605	2,926	3,691	3,828	765	26.1	137	3.7	902	30.8
Agr. Services *	30	43	72	77	29	69.2	5	7.0	35	81.1
Construction *	207	194	162	157	(32)	(16.3)	(5)	(3.4)	(37)	(19.1)
Manufacturing	544	512	437	424	(75)	(14.7)	(13)	(3.0)	(88)	(17.2)
TCU	146	161	199	205	37	23.0	6	3.2	44	27.0
Wholesale	106	122	159	166	38	30.9	6	4.1	44	36.2
Retail	427	494	654	681	160	32.4	28	4.2	187	38.0
FIRE	280	319	410	426	92	28.8	16	3.8	107	33.7
Services	804	1,022	1,540	1,630	518	50.7	89	5.8	608	59.5
Governmental	61	61	62	63	1	2.0	0	0.3	1	2.3

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

percent of projected job growth will be in services, with most of the remaining 30 percent in retail/FIRE industries. There will be a 17-percent loss in the manufacturing base of the division over a 25-year future.

New Castle Division

The New Castle Division in New Castle County encompasses the city of New Castle; several other places, including Hamilton Park, Minquadale, Farnhurst, Wilmington Manor, Collins Park, Jefferson Farms, Pleasantville, Hares Corner, Tybouts Corner; and other unincorporated areas. The division contains 71,000 people, 25,000 jobs, and occupies 37 square miles of land, 60 percent is which is developed (Table I-15).

The city of New Castle was the colonial capital of Delaware and contains some of the oldest housing stock of the state. Six percent of the division's housing stock (almost all in the city of New Castle) was built prior to 1940. New Castle Division contains primarily single-family homes (55 percent) on smaller lots but also has significant numbers of townhouses (17 percent) and multifamily (20 percent) units. Median value of the housing stock was about $88,000 in 1990; median annual income was $36,000. Most of the housing stock is relatively well-maintained and exhibits reasonably low vacancy.

The employment base of New Castle Division is composed of one-third services (8,100), 36 percent manufacturing/retail (8,900), and 24 percent FIRE, construction, and TCU (5,900). The remainder is divided among the wholesale trade, farm services, and government industrial sectors.

Population and Household Growth

Population in the New Castle Division is projected to grow by 12,000, or 17 percent, from 1995 to 2020; households will grow by 5,000, or 20 percent, over the same period. The relationship between household and population growth indicates continued shrinkage in household size and the growth of smaller households in this division.

TABLE I—15
New Castle Division (DE):
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	67,798	71,109	79,519	83,182	8,410	11.8	3,663	4.6	12,073	17.0
HOUSEHOLDS	24,651	26,131	29,528	31,175	3,397	13.0	1,647	5.6	5,044	19.3
EMPLOYMENT	23,633	24,823	28,628	29,914	3,805	15.3	1,286	4.5	5,091	20.5
Agr. Services *	274	320	467	515	147	45.8	48	10.4	195	60.9
Construction *	1,880	1,830	1,673	1,621	(157)	(8.6)	(52)	(3.1)	(209)	(11.4)
Manufacturing	4,934	4,816	4,442	4,318	(375)	(7.8)	(124)	(2.8)	(499)	(10.4)
TCU	1,323	1,381	1,565	1,627	185	13.4	61	3.9	246	17.8
Wholesale	962	1,020	1,207	1,269	187	18.3	62	5.1	249	24.4
Retail	3,871	4,119	4,915	5,178	795	19.3	263	5.4	1,059	25.7
FIRE	2,541	2,684	3,140	3,291	456	17.0	151	4.8	607	22.6
Services	7,298	8,104	10,682	11,535	2,578	31.8	853	8.0	3,431	42.3
Governmental	551	553	559	561	6	1.1	2	0.4	8	1.4

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

Employment Growth

Employment will increase in the New Castle Division by about 21 percent, or 5,100 workers, from 1995 to 2020. Sixty percent of the net increase will be in the services industry (3,430), 18 percent in retail (1,060), 12 percent in FIRE (610) and most of the remaining 14 percent (700) in the agricultural services, wholesale and TCU industries.

Smyrna Division

The Smyrna Division of Kent County encompasses the towns of Smyrna and Clayton as well as other unincorporated areas. The division is nearly 70 square miles in size, of which 85 percent is vacant land. Half of the vacant land is consumed by the Bombay Hook National Wildlife Area in the eastern portion of the division.

The Smyrna Division has a 1995 population size of 11,500 and a job base of 5,600 (Table I-16). It grew in population by 15 percent from 1980 to 1990. The division is territorially located around and economically fed by U.S. 13–DE 1, which run north to south through its developed portions. The Smyrna Division consists primarily of single-family (64 percent) and modular housing (20 percent), with some new townhouse and multi-family construction. In the town, lot size is 40' x 100'; outside, it is one-half to one acre. Nearly one-quarter of the division's housing stock was built prior to 1940. There is some vacancy in structures, but most are relatively well-maintained. Median housing value in Smyrna was $77,400 in 1990; median annual income was $29,200. By comparison, housing values and incomes in this division are somewhat below the New Castle Division and significantly below the Central Pencader Division.

The employment base of the Smyrna Division is comprised of one-third services, one-third retail/manufacturing, and 18 percent government/construction. The remaining 16 percent is divided among the farm services, TCU, FIRE, and wholesale industries.

TABLE I—16
Smyrna Division (DE):
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	10,633	11,466	13,871	15,485	2,406	21.0	1,614	11.6	4,020	35.1
HOUSEHOLDS	3,788	4,129	4,920	5,459	791	19.2	538	10.9	1,329	32.2
EMPLOYMENT	5,515	5,645	6,035	6,295	390	6.9	260	4.3	650	11.5
Agr. Services *	186	196	228	248	32	16.2	20	8.8	52	26.5
Construction *	429	403	325	275	(78)	(19.4)	(50)	(15.3)	(128)	(31.7)
Manufacturing	739	737	732	728	(6)	(0.8)	(4)	(0.5)	(10)	(1.3)
TCU	210	213	223	230	10	4.7	6	2.8	16	7.6
Wholesale	90	89	86	84	(3)	(3.9)	(2)	(2.6)	(6)	(6.3)
Retail	1,273	1,287	1,327	1,353	41	3.2	26	1.9	67	5.2
FIRE	202	205	213	218	8	4.0	5	2.5	13	6.6
Services	1,828	1,962	2,363	2,617	401	20.4	254	10.7	655	33.4
Governmental	557	554	546	542	(8)	(1.4)	(5)	(0.9)	(13)	(2.3)

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

Population and Household Growth

Population will grow by 4,000, or 35 percent, in the Smyrna Division from 1995 to 2020; households will grow by 1,300, or 32 percent, over the same period. The relationship between population and household growth indicates some household size decline and, as well, growth of family households. Growth in the Smyrna Division is about one-third that of the New Castle Division and one-seventh that of the Central Pencader Division.

Employment Growth

Employment will grow by 12 percent in the Smyrna Division over the next several decades: about 700 jobs will be created during this period. Services will constitute almost all of the net increase, with decreases in the construction, manufacturing, wholesale, and governmental sectors neutralizing the very small growth exhibited by all but the services industry.

SUMMARY

Growth in the study communities represents 11 and 8 percent of overall population and household growth, respectively, and 6 percent of overall employment growth that will take place in the Delaware Estuary from 1995 to 2020 (Table I-17 versus Table I-1).

Delaware study communities represent 70 percent of the population growth, 66 percent of the household growth, and 19 percent of the employment growth of study communities in the estuary.

New Jersey study communities represent 23 percent of the population growth, 22 percent of the household growth, and 51 percent of the employment growth of study communities in the estuary.

Pennsylvania study communities represent 7 percent of the population growth, 12 percent of the household growth, and 30 percent of the employment growth of study communities in the estuary.

TABLE I–17
Twelve Community Total:
Population, Households and Employment
Growth Trends and Projections

Component/ Year	1990	1995	2010	2020	Change 1995-2010 #	Change 1995-2010 %	Change 2010-2020 #	Change 2010-2020 %	Change 1995-2020 #	Change 1995-2020 %
POPULATION	298,155	312,726	354,225	378,810	41,500	13.3	24,585	6.9	66,085	21.1
HOUSEHOLDS	106,294	112,629	128,273	137,571	15,644	13.9	9,298	7.2	24,942	22.1
EMPLOYMENT	142,839	146,170	167,375	180,880	21,204	14.5	13,506	8.1	34,710	23.7
Agr. Services *	1,628	1,748	2,570	3,434	821	47.0	864	33.6	1,686	96.4
Construction *	9,466	9,407	9,439	9,657	32	0.3	217	2.3	250	2.7
Manufacturing	34,137	33,505	32,045	31,711	(1,460)	(4.4)	(334)	(1.0)	(1,794)	(5.4)
TCU	8,270	8,630	10,299	11,141	1,669	19.3	842	8.2	2,511	29.1
Wholesale	10,169	10,718	13,308	14,478	2,590	24.2	1,170	8.8	3,760	35.1
Retail	21,967	22,776	26,513	28,263	3,736	16.4	1,750	6.6	5,486	24.1
FIRE	11,073	11,405	12,676	13,288	1,271	11.1	612	4.8	1,883	16.5
Services	41,464	43,510	55,531	63,824	12,021	27.6	8,293	14.9	20,314	46.7
Governmental	4,666	4,481	5,035	5,085	554	12.4	49	1.0	603	13.5

Source: 1. Population and Households - New Jersey Department of Transportation, Pennsylvania Department of Environmental Resources or Delaware State Data Center (Status and Trends of the Delaware Estuary Watershed, DVRPC, 1994c, 1994d)
2. Employment - New Jersey Department of Transportation or Delaware Valley Regional Planning Commission (1990 Census Transportation Planning Package – as modified)

* Construction includes Mining; Agr. Services includes a projection of both agricultural employment and employment related to agricultural services, forestry, fisheries and miscellaneous other. Agricultural employment is in slight decline in most areas of the estuary and as such, is almost totally absent from these projections. Thus, this category of employment, if it shows positive growth, is essentially a projection of non-farm, yet agriculture-related employment. Trends in Agr. Services should not be interpreted as a growth of farm-based employment.

In the land/infrastructure consumption studies and housing cost/fiscal analyses of planned (CCMP) versus trend (STATUS QUO) development, the combined totals should be heavily influenced by Delaware communities in terms of future residential growth, and by New Jersey communities for future nonresidential growth. Pennsylvania communities also have a moderately influential role in the impacts of the two alternative development patterns related primarily to nonresidential development. The next section discusses these development alternatives both for the estuary as a whole and for the individual New Jersey, Pennsylvania, and Delaware study communities.

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Section II

STATUS QUO (TRADITIONAL) AND CCMP (PLANNED) DEVELOPMENT ALTERNATIVES IN THE DELAWARE ESTUARY STUDY COMMUNITIES

INTRODUCTION

The purpose of this section is to discuss in general terms what is viewed as traditional growth for the Delaware Estuary and what type of growth is envisioned by the *Delaware Estuary Plan [Comprehensive Conservation and Management Plan (CCMP)]* for the region. The first is termed trend or STATUS QUO growth and involves the pressures of suburbanization released to follow already-established, natural paths of estuary growth (Burchell et al. 1992b). The second is termed planned or CCMP growth and follows a certain set of land-use principles related to sustainable development.[1] This involves infill and redevelopment of established centers, similar growth in new centers, or old crossroads focus in rural areas and, as well, the minimization of both "skip-over" development and rapidly spreading residential subdivisions and nonresidential strip development along major arterials (Delaware Estuary Program 1995). It also involves appropriate buffering for riparian corridors and the protection of agricultural and frail lands.

The section begins with a discussion of economic growth and its two potential extremes: suburban sprawl and managed growth. This discussion describes what contributes to each and their respective advantages and disadvantages.

The discussion then moves to the land-management components of the *Delaware Estuary Comprehensive Conservation and Management Plan.* This is a formal statement of what the Delaware Estuary Program is attempting to achieve as it relates to the economic development of the region. What is its position on the growth of employment and population? How does this position relate to the growth trends of the region? What is the Delaware Estuary Plan attempting to achieve in terms of land-use patterns? In terms of the conservation of particular categories of land?

The section concludes with a discussion of the likely form and consequences of trend (STATUS QUO) and planned (CCMP) growth in the estuary as a whole and in twelve of its constituent study communities. How is the Delaware Estuary Plan reflected in the growth picture for selected study communities of the region? The answer to this question is found on the pages that follow, and the graphic comparison is found in the appendix to this section.

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[1] Sustainable development is development that meets the resource needs of the present without compromising the ability of future generations to meet their own resource needs (Delaware Estuary Program 1995).

ECONOMIC GROWTH

Economic growth is the sustenance of employment, population, and income of an area (Peterson and Vroman 1992). In each component of growth, there is a natural increase as well as a migration component. The first relates to the type and level of increment as a function of what already exists in an area; the second relates to what will be attracted to an area, either independently or through inducement. There is a lead–lag relationship between jobs and housing in which a certain critical mass of population is needed before a significant amount of jobs come on-stream; yet with the arrival of jobs, so too comes a new increment in population (Mills and McDonald 1992).

In an ideal setting, this is a relatively orderly process, and the public and private institutions that surround this process facilitate growth. Infrastructure is in place where needed, and this infrastructure is neither overused nor undermaintained. Further, there are reasonable relationships between existing and new growth (one does not cannibalize the other), similarly reasonable relationships between residential and nonresidential growth (journey to work is relatively short and efficient), and there is an equitable balance of income groups paralleling job opportunities throughout the region. In other words, growth is both unfettered and efficient so that the economic opportunity of the region is maximized. All of the growth components' directions are harmonious, and minimal conflict leads to maximum regional growth and productivity.

TRADITIONAL GROWTH

Traditional economic growth departs from the idealized state in that (1) the competition for market share causes some inefficiency and waste, and (2) the public- and private-sector institutional overlays contribute to a somewhat lethargic and unresponsive regulatory frame. As examples, nonresidential commercial development is free to locate anywhere in the metropolitan area, maximizing automobile access to the proposed facility. Similarly, industrial development in the form of industrial parks is situated to maximize interstate road system access placing it, also, on the periphery of the metropolitan area (Cervero 1986).

Given this type of location for both forms of nonresidential development that is on or near the beltways or interstates of metropolitan areas, residential development is lured via efficiency criteria to a new outer ring of the

metropolitan area with access from this new outer ring oriented increasingly to beltway or interstate rather than central core job locations.

Associated with this movement outward are both (1) the requirement for more land and public infrastructure to service the radiating growth, and (2) the increasing underutilization of core land and infrastructure. This latter infrastructure may not yet be paid for but, regardless, must be regularly repaired/maintained and even may need to be maintained when surrounding neighborhoods become partially abandoned.

Also associated with this movement outward is the creation of "edge cities," often at the intersection of interstates. These are the new centers of commerce and communications of the region (Garreau 1991). The "string" beltway employment and edge cities allow yet another phenomenon to take place. This is the creation of bedroom counties whose sole purpose is to service the new peripheral employment locations by providing sites of even more peripheral residence. This latter phenomenon occurs because land is least expensive (except for a possibly deteriorating core) the farther the distance from the center of the metropolitan area.

As a result, the metropolitan area (again, except for the core) becomes very homogeneous with industrial, commercial, and residential development either on or immediately off the main radiating spokes from the core or on suburban beltways linking these radiating spokes. The core of the metropolitan area, absent redevelopment, becomes relatively abandoned by a variety of necessary and blue-chip economic activities and a home by default for poor residents who cannot follow (because of income or infirmity), or are not allowed to follow upper-income residents to the suburbs (because of zoning). Even with redevelopment, the central core is a struggling entity with no soft-goods retail anchors, no quality supermarkets or movie theaters, a declining upwardly mobile population, public school systems being replaced by private, and increasingly higher property taxes to pay for rising public service costs (Downs 1994).

The dual costs of (1) providing new infrastructure for those who are moving outward, and (2) maintaining the old infrastructure for the population and economic entities that are left behind, cause taxes and development costs to rise throughout the metropolitan area, thus causing a regional rise in the costs either to do business or to reside in the area. As a result of product cost increases to allow responses to these operating-cost increases, companies and regions become less competitive. The reality of doing little to channel the outward flow

and land appetite of the real estate market brings upon economic triage wherein a finite amount of money is allocated to prepare and access new areas while old areas are left to die. These are the middle-stage signs of a region that is becoming noncompetitive and whose end state is a major loss of economic tenants.

The reason that this process goes on is that traditional development, *in the short run,* is not all that bad for the region. Traditional development is an efficient distribution of economic activities in both a macro and a micro sense (Muller 1981). Firms and people are distributed to localities that minimize *individual* out-of-pocket costs. Shopping and journey to work trips have the greatest amount of freedom and the shortest times, reflecting this allocation of development (Muller 1986).

Traditional development also has a cleansing and regenerative effect. It provides a new market-driven alternative when existing economic entities become dated or difficult/inconvenient to access. Further, traditional development is a bellwether of change. It senses the cutting edge of the desires of consumers and casts that sense in new development product at preferred locations. Moving outward from a dated or inconvenient core is the easiest *individual* solution and what consumers seek in most marketplaces. The larger *societal* costs or impacts of these development patterns are not considered when the firm's or individual's choices are made to pursue them. For these reasons, any alternative that attempts to address the larger issues of development must also consider the ease and short-term decision-making accuracy of traditional development.

PLANNED OR CCMP GROWTH

CCMP growth is an attempt to maximize development resources and limit costs by containing most growth within locations that are more efficient to service. The by-product of this is the saving of frail and other undeveloped lands. The idea is that traditional water and sewer services, road repair and maintenance, municipal functions, school facility development, and solid waste collection would be contained near existing development since most "urban"-scale development projects cannot take place without these services. These types of development controls limit the unrestrained use of undeveloped peripheral land and also limit the costs of providing public infrastructure to this land (Duncan 1989). These controls further help to retain a market for existing or core locations by creating a more limited range of alternatives to these locations. Even

with these controls, the forces of traditional growth are sufficiently strong that beltway development nodes are created in spite of relatively tight observance of favoring close-in rather than peripheral development.

CCMP growth in an economic sense is not restraint of the locational forces of market growth but rather their channeling (Delaware Estuary Program 1995). Much of the employment and population growth that would have taken place under traditional development in leapfrog fashion to the outer reaches of estuary communities is contained around existing growth areas that are efficient to service with public infrastructure. The savings that are achieved here can be plowed back into core areas to thin decaying areas, provide incentives for private development of new and modern replacement structures, additional streetscape improvement efforts including parking, and enhanced public safety to return these areas to a position wherein they are competitive with peripherally growing areas. In the final equation then, there is a more orderly and less wasteful relationship between old and new development. Old areas are not ignored because they are no longer desired; instead, they are refurbished and upgraded. Peripheral areas are not sought as the new "Triple A" locations; rather, there is a much more controlled approach to slicing off additional land segments for primarily residential development. As a result of this process, the contrast between old and new is lessened, and old locations with rejuvenation money have a chance to compete with the new peripheral locations. This allows less new land to be consumed and less additional funding to be allocated to new infrastructure (Hartshorn and Muller 1992).

Why isn't this latter procedure pursued as a matter of course and called "traditional" development? The answer to this question is complex. It lies in the fact that American land conversion has been characterized from its beginning by a "prairie" philosophy. According to this philosophy, land is available in unlimited supply to be converted to developed uses, and it is the responsibility of both political jurisdictions and development professionals within them to ensure that land is ready for development regardless of cost. Economic uses will reside on this land, pay taxes to support required services, and an economic base will develop. Depending upon situation and location, this base will be more or less full and more or less diverse. Land will be worth more at the center or core of a city and increasingly less as the distance from the center increases.

While this argument basically held before the arrival of the automobile and suburbs, with the automobile and suburbs the center has been replaced by numerous smaller centers, or what are termed "multi-nodal locations." Thus,

most of the larger nodes for which American society spent 150 out of 200 years creating infrastructure have been replaced in one-third of that time by other smaller nodes—and there are 100 times as many (Cervero 1986). Further, it becomes difficult to provide for these new locations and simultaneously preserve the old. Yet, the old centers cannot be abandoned because they continue to serve secondary economic purposes and are home to hundreds of thousands of households. It thus becomes necessary to apply restraints to "prairie" development so that preservation of the old can take place and these older locations can retain a share of their original economic purpose.

The generic terms for such procedures are "planned growth" or "growth management." In the Delaware Estuary, it is termed "CCMP growth" or "sustainable development" as promoted by the Delaware Estuary Program.

THE ECONOMIC COMPONENTS OF CCMP GROWTH

CCMP growth or *growth patterns* as they relate to economic development encompass the following principles:[2]

CCMP GROWTH AND EMPLOYMENT AND POPULATION GROWTH

- CCMP growth supports economic growth and development that are consistent with environmental objectives for the estuary. This relates to the concept of sustainable development.
- CCMP growth foresees similar levels of job production and population growth in the Delaware Estuary Region and constituent states as would take place via traditional or STATUS QUO growth. Specific heavy manufacturing or service industries may be an exception due to the waste products that they generate.

CCMP GROWTH AND DEVELOPMENT LOCATION

- CCMP growth foresees growth taking place at locations *within individual communities* that are different from where it would have taken place under traditional development.
- These growth locations in communities under CCMP growth surround or are within existing development centers. At the periphery of development, they are in new rural centers (formerly crossroads) that are strategically located and specified as to size.

[2]DELEP cannot impose any of these growth pattern desires but can attempt to achieve them by education and/or incentive.

Residential growth can take place in peripheral or rural areas outside centers but usually on large lots with significant amounts of open space.

- CCMP growth foresees an increase in the levels of development within the aforementioned growth-designated areas and less development continuing to take place outside these areas. This is in contrast to an increasing percentage taking place in rural and still pristine areas, which is the case for development in several parts of the estuary today.

CCMP GROWTH AND DEVELOPMENT FORM

- CCMP growth foresees some increase in density and floor area ratio in and around existing developed areas (no more than 30 percent), and some decrease in density (at least 30 percent) in areas that are currently rural or marginally developed.
- CCMP growth embraces the concept of an increase in residential clustering, especially in the rural or marginally developed areas.

CCMP GROWTH AND LAND CONSUMPTION

- CCMP growth foresees more efficiency in land-development patterns, i.e., compact development, reducing the amount of developable land consumed.
- CCMP growth is committed to a significant reduction in the takings of prime agricultural and frail lands for development.
- CCMP growth is committed to an increase in the lands used for riparian corridor protection.
- Where lands are retained permanently for the benefit of the public good, some form of payment should be made to private landholders and to host public service jurisdictions for access to this land.

CCMP GROWTH AND OPERATING/CAPITAL PUBLIC SERVICES

- CCMP growth foresees full public services extended to close-in growth areas and more limited public services available to peripheral locations outside.

- CCMP growth seeks to reduce the physical infrastructure required for roads, utilities, public schools, and other public buildings and infrastructure. Infrastructure quality will not suffer; however, quantity will be reduced through efficiency of development patterns and a general decrease in the consumption of capital infrastructure per unit of development.
- CCMP growth, by relying on the unused service capacity of mature service providers (in nearly developed areas), seeks to reduce the public costs of providing various components of municipal and school district services.

CCMP Growth and Housing and Business Development Costs

- CCMP growth is committed to housing availability and affordability and, as well, to the reduction of nonresidential development costs. Land conservation and reduction in densities of development will be controlled to assure that the conservation objectives of CCMP growth do not contribute to a rise in residential or nonresidential land development costs.
- CCMP growth will accommodate residential and nonresidential development need to the level of traditional development at lower overall land consumption rates and development costs.
- Efficiency in land-use patterns, lower amounts of land consumption, lower infrastructure costs, and lower residential and nonresidential development costs contribute to a CCMP-inspired better business environment in the estuary.

STATUS QUO and CCMP Growth Patterns in the Delaware Estuary—Overall and for Selected Communities

DELAWARE ESTUARY

Trend Growth

The Delaware Estuary is characterized by rapidly growing and primarily suburban New Jersey municipalities, either more urban or more rural municipalities in Pennsylvania (on average not growing nearly as fast or as much), and a smaller set of Delaware municipalities and unincorporated areas,

together labeled as Census Divisions, growing very rapidly but not in absolute numbers because there are so few of them.

New Jersey

The New Jersey portion of the estuary is influenced by growth related to the New Jersey Turnpike between exits 1 and 7A and I-295 from Trenton to the Delaware Memorial Bridge. Each of these roadways runs in the general direction of northeast to southwest in the Delaware Estuary. In a more north-south direction, from Deptford to Maurice River Township, the influence of recently improved NJ Route 55 has contributed to some growth. Also influencing growth in the New Jersey portion is the western portion of the Atlantic City Expressway, which runs in a northwest to southeast direction from Gloucester Township (Camden County) to Monroe Township (Gloucester County).

Pennsylvania

The Pennsylvania portion of the estuary is characterized by growth influences on both sides of the I-95—U.S. 1 corridor from Yardley, PA to the Delaware state line. The corridor runs from northeast to southwest and is a significant growth force in southeastern Pennsylvania.

Another force of growth is development related to the Pennsylvania Turnpike, which runs east-west from Bristol Township (Bucks County) to West Chester Borough (Chester County) in this part of the state. Yet another is the Schuylkill Expressway, from center-city Philadelphia to King of Prussia.

Other determinants of growth in the Pennsylvania portion of the estuary are: U.S. 422, which runs southeast to northwest from King of Prussia (Montgomery County) to Reading; I-476, which runs south to north from Chester (Delaware County) to Norristown (Montgomery County); and U.S. 202, running north to south from King of Prussia to West Chester.

Delaware

Delaware's growth is dominated by the I-95—U.S. 40 corridor, which runs from the northern border of Pennsylvania to the southern border of Maryland. The corridor bisects the state in a northeast to southwest direction and is the most significant growth force in the state. U.S. 13 and bypasses labeled DE 1 traverse the state in a north-south direction and influence growth in this direction along the state's eastern border.

Overall

Trend growth in the estuary's communities is controlled exclusively by local zoning in New Jersey and Pennsylvania, and primarily by county zoning in Delaware. Most of the growth in southern New Jersey, southeastern Pennsylvania, and northeastern Delaware is single-family development at 3-5 units per acre. More townhouse construction is evident in Delaware today than is the case for either New Jersey or Pennsylvania. Nonresidential development is primarily in the form of small office and convenience strip development, with shopping centers and office parks at the intersections of major roadways.

New Jersey is characterized by the beginning of development interests out from the Philadelphia-Camden area moving south and east, and the Monmouth-Ocean-Atlantic County area moving west. Municipalities directly on the Delaware River in New Jersey are the slowest growing and most developed of communities in the estuary.

Pennsylvania also has slower-growth communities directly on the Delaware River and faster-growing communities along the Schuylkill River. The fastest-growing communities in the estuary in Pennsylvania are those most north and west from Philadelphia.

Delaware witnessed significant development along the I-95–U.S. 40 corridor and somewhat less so, but also of significant amount, along the U.S. 13–DE-1 corridor. There is more of a mixture of housing types in new development in Delaware than is the case for either New Jersey or Pennsylvania. The latter includes significant townhouse development.

CCMP Growth

New Jersey

CCMP growth in the Delaware Estuary is aided in New Jersey by the presence of the *New Jersey State Development and Redevelopment Plan* and a small portion of the *Pinelands Protection Act* (Maurice River Township and Cape May County). The *New Jersey Coastal Area Facility Review Act (CAFRA)* influences land on the coasts including those in communities along the Delaware River. In New Jersey, counties do not have zoning power, and plans and ordinances are often prepared by private planning consultants. Counties comment on and recommend changes to local plans and ordinances. New Jersey has gone through

a "cross-acceptance" phase by local governments of the State Plan; accordingly, its government officials are familiar with the process of "fitting" local needs within higher-order government objectives for an area.

Pennsylvania

There is no mechanism equivalent to the *New Jersey State Development and Redevelopment Plan* in Pennsylvania or in Delaware, although Pennsylvania is currently reevaluating a formerly established Futures Council at the state level. In Pennsylvania, the counties also do not have zoning power, but although they do not control local plans or derivative regulations, they usually review and sometimes prepare the land-use plan and ordinances for local political jurisdictions. Pennsylvania municipalities continue to champion "home rule," and multi-layered governmental planning is often viewed with some skepticism.

Delaware

In Delaware, the major cities control their own zoning and planning, and unincorporated areas outside cities are influenced by the county or the state. State land-use planning is beginning to emerge in Delaware via the Cabinet Committee on State Planning Issues. Even in the absence of a legally enacted state land-use plan in Delaware, local municipal and county decisions are influenced by state concerns. Home rule is also very strong in the state.

Overall

CCMP growth for the estuary would seek to retain growth around existing centers in communities and plan growth somewhat more in the more rural areas, especially those that border water bodies. There would also be an emphasis on land-use efficiency throughout the estuary with lands saved from development preserved through decreased density and clustering. Further, there would be an attempt to save agricultural and other frail lands from development, protect riparian corridors, and minimize infrastructure provision through compact and mixed-use development. This would take place via a variety of land-use techniques that would *not* create a new level of bureaucracy, *not* increase regional housing costs, and *not* impose costly fiscal impacts to public service jurisdictions. Levels of residential and nonresidential development that would be accommodated under trend or STATUS QUO growth at the regional level would also be accommodated under planned or CCMP growth.

NEW JERSEY STUDY COMMUNITIES

BRIDGETON CITY

STATUS QUO Growth (Table IV–1 and Table II–1A)

Trend development in Bridgeton City (NJ) would involve both a slight growth in housing units and jobs over the period 1995–2020. Housing units would be primarily in the form of duplex structures (doubles) on vacant lots throughout the city, as well as some larger-scale multifamily development.

Nonresidential gains would reflect the development of a state corrections facility along South Burlington Road in the Bridgeton Industrial Park. Development and redevelopment would take place using the existing street grid with minimal consideration of open space planning or riparian corridors. Almost all would be on existing lots in neighborhoods most easily accessed in terms of available property. River redevelopment is not contemplated on anything more than an occasional property that may become available for sale. There is some buffering of the Cohansey River planned. Continued loss of employment and the beginning of household loss are projected.

CCMP Growth (Table IV–1 and Table II–1B)

Under CCMP growth, Bridgeton would gain slightly more residential growth and also increase somewhat its nonresidential growth. Because the city is almost completely developed, there would not be significant shifts in development locations under CCMP growth. CCMP growth would site residential development of characteristic forms in redeveloping neighborhoods at some increase in density to allow for more space for yards and lot-line plantings. There would be some river redevelopment on already disturbed lands in such a way as to both enhance river access and improve the relationship between existing development and the river. Full buffering would take place, and incompatible land uses would be phased out over time. Residential development would be encouraged in the eastern part of the city, away from existing development along Burlington Road and in the northern part, southeast of Pearl Street.

CHESTERFIELD TOWNSHIP

STATUS QUO Growth (Table IV–1 and Table II–2A)

STATUS QUO growth in Chesterfield Township (NJ) would continue existing single-family development on one- to three-acre lots throughout the township. Housing units would increase by nearly 100 percent, adding one

TABLE II–1A

STATUS QUO AND CCMP DEVELOPMENT FUTURES
City of Bridgeton

GENERAL BACKGROUND INFORMATION	City of Bridgeton, Cumberland County, NJ
Center of Existing Development:	Center of City (most of city is developed)
Less Developed Peripheral Areas:	Portions of Southwest and East
Protection Areas	River Buffers [(2) Cohansey, Rocaps]; Lake Buffer (East)

STATUS QUO (TREND) DEVELOPMENT **Residential**	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	40	60
B. *Share of Housing Types by Area of Development (%)* Single-family Townhouse/Doubles Apartment	 20 60 20	 100 - -
C. *Density of Housing Types by Area of Development (units per acre)* Single-family Townhouse/Doubles Apartment	 6 12 22	 4 - -
D. *Agricultural and Frail Land Loss per Acre of Development*[1] Agricultural Lands (acres/acre of development) Frail Lands {water and geologically related} (acres/acre of development)	 - .05	 .10 .10
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	100	-
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)* Office Retail Industrial Warehouse	 .3000 .3500 .2000 .1500	 .2000 .2500 .1250 .0750

[1]Similar rates of consumption under STATUS QUO and CCMP development per taken acre; overall acres consumed, and thus takings of agricultural and frail lands, are less under CCMP (see Appendix Note 2A).

TABLE II–1B
STATUS QUO AND CCMP DEVELOPMENT FUTURES
City of Bridgeton

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	50	50
B. *Share of Housing Types by Area of Development (%)*		
Single-family	25	100
Townhouse/Doubles	65	–
Apartment	10	–
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	7.8	3
Townhouse/Doubles	15.6	–
Apartment	28.6	–
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	100	–
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.3300	.1800
Retail	.3850	.2250
Industrial	.2200	.1125
Warehouse	.1650	.0675
GENERAL HOUSING COSTS[2] (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)		N/A
1995 (new)	$60,000-$80,000	$80,000
Townhouse/Doubles		
1990 (all)	N/A	N/A
1995 (new)	$40,000	–
RENT ($)		
Apartment		
1990 (all)	$340	N/A
1995 (new)	$450	–

NA = not applicable

[2]Housing costs for STATUS QUO and CCMP development begin at the same value and are altered by the amount of land consumed per unit under each scenario (see Appendix Note 2B).

TABLE II–2A

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Chesterfield Township

GENERAL BACKGROUND INFORMATION	Chesterfield Township, Burlington, NJ
Center of Existing Development:	North Central (Crosswicks)
Less Developed Peripheral Areas:	Rest of Township
Protection Areas	Creek Buffers [(3) Blacks Creek, Bacons Run, Crosswicks Creek]

STATUS QUO (TREND) DEVELOPMENT

Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	30	70
B. *Share of Housing Types by Area of Development (%)*		
Single-family	100	100
Townhouse/Duplex	-	-
Apartment	-	-
C *Density of Housing Types by Area of Development (units per acre)*		
Single-family	.6	.3
Townhouse/Duplex	-	-
Apartment	-	-
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.60	.90
Frail Lands {water and geologically related} (acres/acre of development)	.10	.20
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	100	-
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C *Floor Area Ratio (FAR)*		
Office	.2000	.1500
Retail	.2500	.2000
Industrial	.1250	.1000
Warehouse	.0750	.0500

TABLE II–2B

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Chesterfield Township

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	50	50
B. *Share of Housing Types by Area of Development (%)*		
Single-family	100	100
Townhouse/Duplex	-	-
Apartment	-	-
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	1.0	.2
Townhouse/Duplex	-	-
Apartment	-	-
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	100	-
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2200	.1350
Retail	.2750	.1800
Industrial	.1375	.0900
Warehouse	.0825	.0450
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$184,500	N/A
1995 (new)	$210,000	$250,000
Townhouse/Duplex		
1990 (all)	N/A	N/A
1995 (new)	N/A	-
RENT ($)		
Apartment		
1990 (all)	$4505	N/A
1995 (new)	N/A	-

NA = not applicable

thousand units to a similar base over the 1995–2020 development period. Most of the development would be in the rural–agricultural areas of the township (away from Crosswicks Village), off Georgetown-Chesterfield, Chesterfield-Crosswicks, Bordentown-Chesterfield, and Chesterfield-Arneytown Roads. STATUS QUO growth would consume significant amounts of agricultural land in the form of "piano key" or subdivision development along major thoroughfares. Reasonably significant nonresidential development would take place under STATUS QUO growth, possibly at the crossroads of the roads previously mentioned. Nonresidential space would increase by 2.5 million square feet to accommodate a projected growth in employment of an additional 4.6 times the current level. All residential development away from Crosswicks would be on septic systems and all nonresidential development on packaged treatment plants. Storm drainage ponds would be concrete, and creeks would not be consistently buffered.

CCMP Growth (Table IV–1 and Table II–2B)

CCMP growth in Chesterfield Township would slightly lower residential units and decrease job growth by 10 percent. CCMP growth in Chesterfield Township would attempt to contain growth around Crosswicks Village in the northern part of the community and the above-mentioned crossroads of County 528 (Bordentown-Chesterfield and Chesterfield-Arneytown), and County 660 (Georgetown-Chesterfield and Chesterfield-Crosswicks). Development in the area of Crosswicks would be at a 30 percent density increase over existing development; development in the more rural areas would be at two-thirds the density of current levels. Twenty percent of the single-family housing built in rural areas would be clustered. Blacks Creek, Bacons Run, and Crosswicks Creek all would be provided 50′ buffers at points where development approaches. Drainage swales and filter strips would accompany all roadway development supporting growth, and stormwater retention basins or wet ponds are part of the required site improvements.

COMMERCIAL TOWNSHIP

STATUS QUO Growth (Table IV–1 and Table II–3A)

Almost all development slated for Commercial Township for the next 25 years would be residential (730 units). Growth in Commercial Township following historical patterns would involve small single-family ranch homes in the Port

TABLE II–3A
STATUS QUO AND CCMP DEVELOPMENT FUTURES
Commercial Township

GENERAL BACKGROUND INFORMATION	Commercial Township, Cumberland County, NJ
Centers of Existing Development:	Lower South–Central; (Port Norris); East Central (Mauricetown); Northeast Corner (Laurel Lakes)
Less Developed Peripheral Areas:	Center and Western Area of Township
Protection Areas	Wildlife Management Areas (NW, SW)

STATUS QUO (TREND) DEVELOPMENT

Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	60	40
B. *Share of Housing Types by Area of Development (%)*		
Single-family	70	100
Townhouse/Mobile	30	–
Apartment	–	–
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	3	1.0
Townhouse/Mobile	5	–
Apartment	–	–
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.15	.90
Frail Lands (water and geologically related) (acres/acre of development)	.30	.50
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	–	100
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2000	.1500
Retail	.2500	.2000
Industrial	.1250	.1000
Warehouse	.0750	.0500

TABLE II–3B

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Commercial Township

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	80	20
B. *Share of Housing Types by Area of Development (%)*		
Single-family	60	100
Townhouse/Mobile	40	-
Apartment	-	-
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	3.9	.5
Townhouse/Mobile	6.5	-
Apartment	-	-
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	40	60
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2200	.1350
Retail	.2750	.1800
Industrial	.1375	.0900
Warehouse	.0825	.0450
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$50,900	N/A
1995 (new)	$70,000-$80,000	$125,000
Townhouse/Mobile		
1990 (all)	N/A	-
1995 (new)	$55,000-$65,000	-
RENT ($)		
Apartment		
1990 (all)	$341	N/A
1995 (new)	$450-$550	-

NA = not applicable

Norris area; mobile and conventional homes on smaller lots in the Laurel Lake area; and single-family homes on one acre in extraction sites between Maurice-town and Haleyville, possibly around man-made lakes.

Marine-related nonresidential development would be promoted along the Maurice Riverfront from Bivalve to Shell Pile. Two existing business centers that could receive some small expansion are in the Laurel Lake (northeast) and Port Norris (south-central) areas. No more than a 50-job net employment increase is projected for Commercial Township in the future under STATUS QUO.

Significant efforts are ongoing locally to encourage ecotourism and to develop the riverfront. Saltwater marshes previously used for a salt hay crop are being restored to a more natural state by the Public Service Electric and Gas Company of New Jersey (PSE&G). This is part of the ongoing mitigation efforts related to the Salem Nuclear Power Plant. More than 50 percent of the land in Commercial Township is owned by the State of New Jersey.

CCMP Growth (Table IV–1 and Table II–3B)

CCMP growth in Commercial Township would involve slightly more residential units and a tripling of a very small STATUS QUO employment growth. Centers of future development under CCMP are the areas around Port Norris, Mauricetown, and Laurel Lakes. Less growth would be directed to the RA areas (residential one acre) in the central portion of the township.

Maurice River nonresidential development would be encouraged from Bivalve to Shell Pile, and residential development would be encouraged farther north. Both would require adequate buffering of the river when development encroaches and, as well, overall improved water treatment facilities.

New Jersey Department of Environmental Protection and local officials must reach agreement on standards for water treatment levels so that marine-related nonresidential redevelopment is not stalled. PSE&G reclamation efforts in the marshes would be encouraged and, again, adequately buffered against development in the RA zones. RA zone development would encourage cluster housing, and the density of development would be lessened. Drainage swales and wet ponds would accompany all new development and must be carefully constructed because most of the township is below sea level.

PENNSAUKEN TOWNSHIP

STATUS QUO Growth (Table IV–1 and Table II–4A)

Pennsauken Township is projected to receive an 11 percent increase in residential units (1,400) and a 32 percent increase in job base (9,700). Thirty to 60 percent residential and nonresidential growth under STATUS QUO development would take place east of Union Avenue, away from existing development.

Most residential development would be single-family units on 50' x 100' lots spread throughout the township, with a small cluster at Rogers Avenue and Union Avenue.

Nonresidential development would largely recycle existing warehouses primarily along Hilton Road, and some new construction would take place along River Road. Most of the nonresidential development would serve distribution needs as the location of Pennsauken Township relative to Philadelphia and Cherry Hill promotes this type of growth.

CCMP Growth (Table IV–1 and Table II–4B)

CCMP growth in Pennsauken Township would involve about the same number of residential units as STATUS QUO development and an 8 percent decrease in employment growth. CCMP growth objectives would concentrate more employment growth in locations west of Union Avenue along River Road. Reuse of existing warehouses along Hilton Road should be encouraged. As properties are reused in the vicinity of Hilton Road, restoration of the Pennsauken Creek will be encouraged. Cooper River Park, currently under-maintained, would undergo cosmetic restoration. The edges of the Iron Rock Golf Course, as an open space feature of this otherwise developed community, would be promoted as a limited residential development site.

WEST DEPTFORD TOWNSHIP

STATUS QUO Growth (Table IV–1 and Table II–5A)

West Deptford Township would increase its residential base by 30 percent (2,350 units) under STATUS QUO growth and would expand its employment base by nearly 48 percent (2,265 jobs). Residential development would be primarily in the form of single-family development on one-half acre lots in the western (least developed) portion of the township.

New nonresidential development would also take place in this portion of the township, primarily near Grove Road and I–295. There would also be some infill development in existing industrial parks.

TABLE II–4A
STATUS QUO AND CCMP DEVELOPMENT FUTURES
Pennsauken Township

GENERAL BACKGROUND INFORMATION	Pennsauken Township, Camden County, NJ	
Centers of Existing Development:	Central–North to South along Route 130 (South of Union Avenue)	
Less Developed Peripheral Areas:	Along Delaware River (West); Near Pennsauken Creek (North and East)	
Protection Areas	River Buffers [(2) Delaware and Cooper]; Creek Buffer (Pennsauken)	
STATUS QUO (TREND) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	70	30
B. *Share of Housing Types by Area of Development (%)*		
Single-family	90	100
Townhouse/Duplex	10	-
Apartment	-	-
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	8	10
Townhouse/Duplex	10	-
Apartment	-	-
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.00	.00
Frail Lands (water and geologically related) (acres/acre of development)	.05	.10
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	40	60
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.3000	.2000
Retail	.3500	.2500
Industrial	.2000	.1250
Warehouse	.1500	.0750

TABLE II–4B

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Pennsauken Township

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	85	15
B. *Share of Housing Types by Area of Development (%)*		
Single-family	80	100
Townhouse/Duplex	20	–
Apartment	–	–
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	10.4	12
Townhouse/Duplex	13.0	–
Apartment	–	–
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	60	40
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.3300	.1800
Retail	.3850	.2250
Industrial	.2200	.1125
Warehouse	.1650	.0675
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$91,000	N/A
1995 (new)	$125,000	$145,000
Townhouse/Duplex		
1990 (all)	NA	–
1995 (new)	$75,000	–
RENT ($)		
Apartment		
1990 (all)	$430	N/A
1995 (new)	$600	–

NA = not applicable

TABLE II–5A

STATUS QUO AND CCMP DEVELOPMENT FUTURES
West Deptford Township

GENERAL BACKGROUND INFORMATION	West Deptford Township, Gloucester County, NJ
Centers of Existing Development:	Northern Part
Less Developed Peripheral Areas:	Extreme Southern Part; Selected Tracts in Middle of Township
Protection Areas	Wetlands (Lower Western Portion); Creek Buffers (Mantua, Matthews) River Buffers (Delaware–Western Portion)

STATUS QUO (TREND) DEVELOPMENT

Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	10	90
B. *Share of Housing Types by Area of Development (%)*		
Single-family	90	100
Townhouse/Duplex	10	–
Apartment	–	–
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	4	2
Townhouse/Duplex	10	–
Apartment	20	–
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.05	.50
Frail Lands (water and geologically related) (acres/acre of development)	.10	.25
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	–	100
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2500	.2000
Retail	.3000	.2500
Industrial	.1500	.1250
Warehouse	.1000	.0750

TABLE II–5B
STATUS QUO AND CCMP DEVELOPMENT FUTURES
West Deptford Township

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	30	70
B. *Share of Housing Types by Area of Development (%)*		
Single-family	80	100
Townhouse/Duplex	20	-
Apartment	-	-
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	5.2	1.5
Townhouse/Duplex	13.0	-
Apartment	26.0	-
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	20	80
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2750	.1800
Retail	.3300	.2250
Industrial	.1650	.1125
Warehouse	.1100	.0675
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$101,300	N/A
1995 (new)	$165,000	$200,000
Townhouse/Duplex		
1990 (all)	N/A	N/A
1995 (new)	$95,000	-
RENT ($)		
Apartment		
1990 (all)	$481	N/A
1995 (new)	$650	-

NA = not applicable

The Delaware River (in the Northeast) and Mantua Creek (western edge) contain vacant parcels whose use and protection are currently uncoordinated.

CCMP Growth (Table IV-1 and Table II-5B)

Under CCMP growth, there would be about the same amount of residential growth and somewhat less (9 percent) employment growth as under STATUS QUO.

CCMP growth would more heavily emphasize residential and nonresidential development in the eastern half of the township. Residential development densities would be increased somewhat in this location to compensate for a 25 percent decrease in the western portion of the township.

Future plans call for mixed-use development of some areas along the Delaware River although access through wetlands could be difficult. Any river development would be accompanied by adequate buffering and pedestrian access.

PENNSYLVANIA STUDY COMMUNITIES

BENSALEM TOWNSHIP

STATUS QUO Growth (Table IV-1 and Table II-6A)

STATUS QUO growth for Bensalem Township projects an 11 percent growth in residential units (2,500) and a near 24 percent increase (8,335) in employment. Most of this growth would be primarily single-family development on one-third-acre lots in the central portion of the township. Nonresidential development would be office-commercial in the township's northwest and southeast corners. The latter would be infill along State Road.

CCMP Growth (Table IV-1 and Table II-6B)

CCMP growth in Bensalem Township would involve a similar number of residential units and a slight decrease (4 percent) in employment growth. Bensalem Township, due to its existing level of development, is difficult to segment into areas of existing development (more developed) versus less developed areas. Under CCMP growth, more future development would be kept south of the Pennsylvania Turnpike, north of State Road and in the west-central three-quarters of the township. Redevelopment areas could be those that may already have an existing use that is past its prime (Philadelphia Park Race Track).

Residential development in the above peripheral areas would experience a 25 percent decrease in density; areas toward the center, about a similar

TABLE II–6A
STATUS QUO AND CCMP DEVELOPMENT FUTURES
Bensalem Township

GENERAL BACKGROUND INFORMATION	Bensalem Township, Bucks County, Pennsylvania
Centers of Existing Development:	South and West-Central Parts of Township
Less Developed Peripheral Areas:	North of Pennsylvania Turnpike
Protection Areas	Stream Buffers [(2), Poquessing, Neshaminy]; River Buffer [(1) Delaware]

STATUS QUO (TREND) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	80	20
B. *Share of Housing Types by Area of Development (%)*		
Single-family	80	100
Townhouse/Duplex	20	
Apartment	–	
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	3	2
Townhouse/Duplex	10–12	–
Apartment	16–20	–
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.05	.05
Frail Lands (water and geologically related) (acres/acre of development)	.05	.05
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	90	10
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2500	.2000
Retail	.3000	.2500
Industrial	.1500	.1250
Warehouse	.1000	.0750

TABLE II–6B

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Bensalem Township

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	90	10
B. *Share of Housing Types by Area of Development (%)*		
Single-family	70	100
Townhouse/Duplex	30	-
Apartment	-	-
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	3.9	1.5
Townhouse/Duplex	14.3	-
Apartment	23.4	-
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	100	-
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2750	.1800
Retail	.3300	.2250
Industrial	.1650	.1125
Warehouse	.110	.0675
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$117,400	
1995 (new)	$155,000	$175,000
Townhouse/Duplex		
1990 (all)	N/A	N/A
1995 (new)	$105,000	-
RENT ($)		
Apartment		
1990 (all)	$540	N/A
1995 (new)	$700	-

NA = not applicable

percentage increase in density. Streams in the central portion of the township flowing through development areas would be buffered and protected as necessary. Open space areas in the central portion of the community would be obtained and preserved. Wetlands along the Delaware River would also be buffered and isolated from riverfront redevelopment. Public roadways in the Trevose section would be improved and resurfaced.

CHESTER CITY

STATUS QUO Growth (Table IV–1 and Table II–7A)

STATUS QUO growth for the city of Chester would involve the loss of 14 percent of its resident households (1,860) over the period 1995 to 2020. Although employment losses for this same period appear much less (a decrease of 30 jobs, or –0.2 percent), interim losses would be much more severe. Losses would involve continued population and employment thinning of the downtown and would extend to the northern area around Widener College. These would be in the form of largely rowhouse-structure abandonments.

Land along the Delaware River on the city's southeast border is owned privately by shipbuilders and utility companies and publicly by Delaware County. The city of Chester currently can do little directly to influence waterfront development on these sites.

CCMP Growth (Table IV–1 and Table II–7B)

CCMP growth for the city of Chester would cut the loss of households (and, ultimately, housing stock) by one-half. Employment would experience no losses after an addition of 30 more jobs than under a STATUS QUO future. Reduced household losses would stabilize somewhat the downtown, and retention of employment would serve to halt nonresidential structure abandonment.

Joint city-county efforts to develop the river waterfront would be initiated under the CCMP alternative. This would further augment the declining tax base of the city.

EAST COVENTRY TOWNSHIP

STATUS QUO Growth (Table IV–1 and Table II–8A)

STATUS QUO growth in East Coventry Township would involve expanding its residential base by 12 percent over the period 1995 to 2020 (205

TABLE II–7A

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Chester City

GENERAL BACKGROUND INFORMATION	Chester City, Delaware County, Pennsylvania	
Centers of Existing Development:	East–Central Part	
Less Developed Peripheral Areas:	North (Widener College) Area Along Riverfront (with buffer)	
Protection Areas	Delaware River Redevelopment	
STATUS QUO (TREND) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	90	10
B. *Share of Housing Types by Area of Development (%)*		
Single-family	20	70
Townhouse/Duplex	60	20
Apartment	20	10
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	10	6
Townhouse/Duplex	20	10
Apartment	30	15
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.00	.00
Frail Lands (water and geologically related) (acres/acre of development)	.10	.10
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	95	5
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.3000	.2000
Retail	.3500	.2500
Industrial	.2000	.1250
Warehouse		

TABLE II–7B

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Chester City

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	100	-
B. *Share of Housing Types by Area of Development (%)*		
Single-family	30	-
Townhouse/Duplex	70	-
Apartment	-	-
C *Density of Housing Types by Area of Development (units per acre)*		
Single-family	13.0	-
Townhouse/Duplex	26.0	-
Apartment	39.0	-
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	100	-
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C *Floor Area Ratio (FAR)*		
Office	.3300	.1800
Retail	.3850	.2250
Industrial	.2200	.1125
Warehouse	.1650	.0675
		-
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$38,400	N/A
1995 (new)	$50,000	$60,000
Townhouse/Duplex		
1990 (all)	N/A	N/A
1995 (new)	$35,000	-
RENT ($)		
Apartment		
1990 (all)	$291	N/A
1995 (new)	$350	-

NA = not applicable

TABLE II–8A

STATUS QUO AND CCMP DEVELOPMENT FUTURES
East Coventry Township

GENERAL BACKGROUND INFORMATION	East Coventry, Chester County, PA
Centers of Existing Development:	East–Central Part (Parkerford)
Less Developed Peripheral Areas:	Central and Western Parts
Protection Areas	River Buffer (Schuykill); Creek Buffers [(2) Pigeon, Unnamed]

STATUS QUO (TREND) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	20	80
B. *Share of Housing Types by Area of Development (%)*		
Single-family	100	100
Townhouse/Duplex	–	–
Apartment	–	–
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	.75	.5
Townhouse/Duplex	–	–
Apartment	–	–
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.20	.60
Frail Lands (water and geologically related) (acres/acre of development)	.10	.30
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	100	–
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2000	–
Retail	.2500	–
Industrial	.1250	–
Warehouse	.0750	–

TABLE II–8B

STATUS QUO AND CCMP DEVELOPMENT FUTURES
East Coventry Township

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	45	55
B. *Share of Housing Types by Area of Development (%)*		
Single-family	100	100
Townhouse/Duplex	-	-
Apartment	-	-
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	.98	.33
Townhouse/Duplex	-	-
Apartment	-	-
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	-	-
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2200	-
Retail	.2750	-
Industrial	.1375	-
Warehouse	.0875	-
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$140,200	N/A
1995 (new)	$195,000	$215,000
Townhouse/Duplex		
1990 (all)	N/A	N/A
1995 (new)	-	-
RENT ($)		
Apartment		
1990 (all)	$401	N/A
1995 (new)	-	-

NA = not applicable

units). Nonresidential growth would expand the local employment base by 27 percent (109 jobs). Residential development would take place primarily in less developed areas in the southwest and central portions of the township, the latter bounded by Ellis Woods, Kulp, and Halteman roads. This would be in the form of single-family development on 1.5- to 2-acre lots.

Nonresidential development in the form of convenience-serving business establishments would grow in the Parker Ford area.

CCMP Growth (Table IV–1 and Table II–8B)

CCMP growth in East Coventry would involve slightly less residential and nonresidential growth (decreases of 7 and 4 percent, respectively). CCMP growth would emphasize residential development in the Parker Ford area of the township at a density of less than one unit per acre. Growth in the less-developed portion of the township (southwest) would involve single-family construction at one unit per 3 acres.

As development proceeds, Pigeon Creek would be buffered as warranted and select pedestrian access provided to the Schuykill River.

WHITPAIN TOWNSHIP

STATUS QUO Growth (Table IV–1 and Table II–9A)

STATUS QUO growth in Whitpain Township would involve expansion of the base number of residential units by nearly 38 percent (2,350). Nonresidential growth would involve a 9 percent expansion of the job base (1,550). Residential development would take place primarily peripheral to most existing development in the eastern portion of the township, along Morris Road, significantly northeast of the Pennsylvania Turnpike. Residential development would be primarily single-family homes on one-quarter- to one-half-acre lots.

Nonresidential development of commercial office space would take place along DeKalb Pike. Both forms of future development would consume significant amounts of prime agricultural lands in the township.

CCMP Growth (Table IV–1 and Table II–9B)

CCMP growth in Whitpain Township would involve 8 percent less residential development and essentially similar amounts of employment development as STATUS QUO growth. Residential development would be concentrated at somewhat higher densities in the western portion of the township east and west of the Pennsylvania Turnpike. Reduced residential development

TABLE II–9A

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Whitpain Township

GENERAL BACKGROUND INFORMATION	Whitpain Township, Montgomery County, Pennsylvania	
Centers of Existing Development:	Western–Central Part of Community	
Less Developed Peripheral Areas:	North, Northeast, and Southeast Parts of Township	
Protection Areas	Creek Buffers [(5) Stoney, Wissahickon, Unnamed (3)]	
STATUS QUO (TREND) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	30	70
B. *Share of Housing Types by Area of Development (%)*		
Single-family	75	100
Townhouse/Duplex	25	
Apartment	-	
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	3	3
Townhouse/Duplex	8	-
Apartment	-	-
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.30	.60
Frail Lands (water and geologically related) (acres/acre of development)	.05	.10
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	80	20
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2000	.1500
Retail	.2500	.2000
Industrial	.1250	.1000
Warehouse	.0750	.0500

TABLE II–9B
STATUS QUO AND CCMP DEVELOPMENT FUTURES
Whitpain Township

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	50	50
B. *Share of Housing Types by Area of Development (%)*		
Single-family	65	100
Townhouse/Duplex	35	-
Apartment	-	-
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	3.9	2
Townhouse/Duplex	10.4	-
Apartment	-	-
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	100	-
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2200	.1350
Retail	.2750	.1800
Industrial	.1375	.0900
Warehouse	.0825	.0450
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$213,300	
1995 (new)	$275,000	$325,000
Townhouse/Duplex		
1990 (all)	N/A	N/A
1995 (new)	$135,000	-
RENT ($)		
Apartment		
1990 (all)	$740	
1995 (new)	$950	N/A

NA = not applicable

primarily in the form of single-family homes on one-half-acre lots would take place in the eastern portion of the township.

All nonresidential development would take place in the western portion. It would be supported by natural drainage swales and a minimization of other concrete infrastructure.

DELAWARE STUDY COMMUNITIES

CENTRAL PENCADER DIVISION

STATUS QUO Growth (Table IV–1 and Table II–10A)

STATUS QUO growth would increase the residential base of this census division by 125 percent (10,725 units). This would largely be in the form of single-family development on one-third-acre lots west of State Road 896 or south of Porter Road. Limited townhouse and multifamily development could take place along State Road 72.

Nonresidential development would expand the employment base by 31 percent (900 jobs) in the form of office and retail growth along State Road 896. Significant amounts of wetlands west of Route 896 would be consumed by STATUS QUO growth.

CCMP Growth (Table IV–1 and Table II–10B)

CCMP growth for the Central Pencader Division would involve similar amounts of residential development and slightly less (–3 percent) employment growth than under the STATUS QUO scenario.

CCMP growth objectives would confine most of the development east of State Road 896 and north of Porter Road. This would involve additional townhouse development and moderate increases in development density there.

Significantly less development, primarily in the form of single-family homes on one-half-acre lots, would take place west of State Road 896 and south of Porter Road. Many of these units would be clustered to avoid wetlands intrusion. Wildlife management areas, parks, and riparian corridors also would be buffered in this locality.

TABLE II–10A

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Central Pencader Division

GENERAL BACKGROUND INFORMATION	Central Pencader Division, New Castle County, Delaware
Centers of Existing Development:	Central (Glasgow)
Less Developed Peripheral Areas:	West and South Parts of Division
Protection Areas	State Park (Lums), Wildlife Management Area (Canal), Lake Buffer (Sunset)

STATUS QUO (TREND) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	20	80
B. *Share of Housing Types by Area of Development (%)*		
Single-family	70	100
Townhouse/Duplex	25	-
Apartment	5	-
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	4.5	3.0
Townhouse/Duplex	10	-
Apartment	20	-
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.30	.70
Frail Lands (water and geologically related) (acres/acre of development)	.30	.60
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	50	50
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2000	.1500
Retail	.2500	.2000
Industrial	.1250	.1000
Warehouse	.0750	.0500

TABLE II–10B
STATUS QUO AND CCMP DEVELOPMENT FUTURES
Central Pencader Division

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	50	50
B. *Share of Housing Types by Area of Development (%)*		
Single-family	65	100
Townhouse/Duplex	30	-
Apartment	5	-
C *Density of Housing Types by Area of Development (units per acre)*		
Single-family	5.85	2.0
Townhouse/Duplex	13.0	-
Apartment	26.0	-
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	75	25
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C *Floor Area Ratio (FAR)*		
Office	.2200	.1350
Retail	.2750	.1800
Industrial	.1375	.0900
Warehouse	.0825	.0450
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$127,500	N/A
1995 (new)	$150,000	$200,000
Townhouse/Duplex		
1990 (all)	N/A	N/A
1995 (new)	$90,000.	-
RENT ($)		
Apartment		
1990 (all)	$510	N/A
1995 (new)	$750	-

NA = not applicable

NEW CASTLE DIVISION

STATUS QUO Growth (Table IV–1 and Table II–11A)

STATUS QUO growth would involve an expansion of the residential base by 20 percent (5,330 units) and the job base by 20 percent (5,000 jobs). Residential growth would take the form of primarily single-family development on one-quarter-acre lots with some portion of townhouses at ten units to the acre. There would also be a minimal level of multifamily development. Lower-density residential development would take place in the southwest portion of the division near U.S. Route 40. Moderate-density residential development would take place in the central portion of the division along Churchman's Road.

Nonresidential development would be found off U.S. Route 40 near Walther Road and Church Road.

Development in the southeastern corner would involve significant wetland intrusions.

CCMP Growth (Table IV–1 and Table II–11B)

CCMP growth would involve similar numbers of residential unit development and slightly less (–3 percent) job growth than under the STATUS QUO future. An attempt would be made under CCMP growth to locate more development in the southwestern portion of the division. This pattern of development is essentially similar to what would be observed under STATUS QUO growth; however, these locations would experience both some increase in density and more multifamily housing types.

Residential development in the southeastern and far south areas under CCMP would be lessened and densities decreased. Nonresidential development would be largely confined along U.S. Route 13. Red Lion Creek and the Christina River would be buffered as development approaches.

SMYRNA DIVISION

STATUS QUO Growth (Table IV–1 and Table II–12A)

STATUS QUO growth in the Smyrna Division would involve a 12 percent expansion of the residential base (1,400 units) and a slightly lower expansion (11.5 percent) of the job base (650 jobs). Residential development would take place largely outside the town of Smyrna, primarily to the south and southeast. It would be in the form of single-family homes on one-third to one-acre lots. Development sites will be accessed primarily from U.S. Route 13.

TABLE II–11A

STATUS QUO AND CCMP DEVELOPMENT FUTURES
New Castle Division

GENERAL BACKGROUND INFORMATION	New Castle Division, New Castle County, DE	
Centers of Existing Development:	Northeast including City of New Castle	
Less Developed Peripheral Areas:	Southeast and Far Southwest Parts of Division	
Protection Areas	River Buffers [(2) Delaware, Christina]; Creek Buffer (Red Lion); Wetlands (East, West)	
STATUS QUO (TREND) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	25	75
B. *Share of Housing Types by Area of Development (%)*		
Single-family	70	100
Townhouse/Duplex	25	-
Apartment	5	-
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	4.5	4
Townhouse/Duplex	10.0	-
Apartment	20	-
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.10	.50
Frail Lands (water and geologically related) (acres/acre of development)	.10	.30
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	70	30
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2500	.2000
Retail	.3000	.2500
Industrial	.1500	.1250
Warehouse	.1000	.0750

TABLE II–11B
STATUS QUO AND CCMP DEVELOPMENT FUTURES
New Castle Division

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	60	40
B. *Share of Housing Types by Area of Development (%)*		
Single-family	65	100
Townhouse/Duplex	30	-
Apartment	-	-
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	5.85	2.5
Townhouse/Duplex	13.0	-
Apartment	26.0	-
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	80	20
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2750	.1800
Retail	.3300	.2250
Industrial	.1650	.1125
Warehouse	.1100	.0075
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$87,800	
1995 (new)	$135,000	$175,000
Townhouse/Duplex		
1990 (all)	N/A	N/A
1995 (new)	$80,000	-
RENT ($)		
Apartment		
1990 (all)	$472	N/A
1995 (new)	$600	-

NA = not applicable

TABLE II–12A

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Smyrna Division

GENERAL BACKGROUND INFORMATION	Smyrna Division, Kent County, Delaware
Centers of Existing Development:	Towns of Smyrna and Clayton
Less Developed Peripheral Areas:	Almost all to South and East Except Smyrna and Clayton
Protection Areas	Bombay Hook Natural Wildlife Refuge Area River Buffers [(2) Smyrna, Leipsic]

STATUS QUO (TREND) DEVELOPMENT

Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	30	70
B. *Share of Housing Types by Area of Development (%)*		
Single-family	100	100
Townhouse/Duplex	–	–
Apartment	–	–
C. *Density of Housing Types by Area of Development (units per acre)*		
Single-family	3	1
Townhouse/Duplex	15	–
Apartment	20	–
D. *Agricultural and Frail Land Loss per Acre of Development*		
Agricultural Lands (acres/acre of development)	.40	.90
Frail Lands (water and geologically related) (acres/acre of development)	.20	.10
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	20	80
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C. *Floor Area Ratio (FAR)*		
Office	.2000	.1500
Retail	.2500	.2000
Industrial	.1250	.1000
Warehouse	.0750	.0500

TABLE II–12B

STATUS QUO AND CCMP DEVELOPMENT FUTURES
Smyrna Division

CCMP (PLANNED) DEVELOPMENT		
Residential	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	55	45
B. *Share of Housing Types by Area of Development (%)*		
Single-family	100.0	70 30
Townhouse/Duplex		-
Apartment		-
C *Density of Housing Types by Area of Development (units per acre)*		
Single-family	3.9	1.0 .5
Townhouse/Duplex	-	-
Apartment	-	-
Nonresidential (includes Public)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
A. *Overall Share of Development, by Area (%)*	40	60
B. *Share of Development by SIC Category*	as determined by 1990 municipal employment distribution and 1980-1990 county employment trends	
C *Floor Area Ratio (FAR)*		
Office	.2200	.1350
Retail	.2750	.1800
Industrial	.1375	.0900
Warehouse	.0825	.0450
GENERAL HOUSING COSTS (Municipality by Type)	NEAR EXISTING DEVELOPMENT	LESS DEVELOPED PERIPHERAL AREAS
VALUE ($)		
Single-family		
1990 (all)	$77,400	N/A
1995 (new)	$130,00	$120,000
Townhouse/Duplex		
1990 (all)	N/A	N/A
1995 (new)	-	-
RENT ($)		
Apartment		
1990 (all)	$295	N/A
1995 (new)	-	-

NA = not applicable

Nonresidential development, primarily in the form of retailing, would also take place outside the town of Smyrna, in the division along U.S. Route 13.

CCMP Growth (Table IV–1 and Table II–12B)

Residential and nonresidential development levels under CCMP growth are almost identical to those under STATUS QUO; growth in both categories would be located closer to the town of Smyrna. Most development densities in unincorporated areas would be maintained at one unit per acre.

CCMP growth would avoid wetland areas for that portion of development occurring outside the town of Smyrna.

SUMMARY

Growth in the Delaware Estuary study communities will be uneven and vary considerably.

Significant residential growth will take place in most New Jersey and Delaware communities; significant nonresidential growth will occur in Pennsylvania and New Jersey. Residential growth will be almost exclusively single-family development, except that which is taking place in the Delaware communities. Nonresidential growth will be largely strip or mall commercial and contain a limited amount of office space construction.

STATUS QUO growth would allow most of this development to situate in largely undeveloped areas; CCMP growth would contain it somewhat.

While there are noticeable differences regarding the location and intensity of growth between the STATUS QUO and CCMP scenarios, the differences are far from striking. This is because developed portions of the region are already at high densities and exhibit some amounts of development concentration. Planned growth alternatives to this existing development pattern are thus somewhat constrained.

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APPENDIX

STATUS QUO AND CCMP DEVELOPMENT LOCATIONS IN NEW JERSEY, DELAWARE, AND PENNSYLVANIA STUDY COMMUNITIES

1. The maps included herein provide a visual depiction of STATUS QUO and CCMP growth in each of the study communities. These maps show approximate locations of both proposed future residential and nonresidential development at the densities and FARs noted in the tables for each community in Section II. These maps further ensure that estimates of both STATUS QUO and CCMP land requirements relative to projected growth fit within vacant land supplies available for consumption over the projection period. Although their physical presence has been taken into account, existing locations of nonresidential development are not shown on the maps.
2. STATUS QUO and CCMP tables in Section II contain essentially the same information for each growth scenario. This involves: (1) what type of growth will take place, (2) where it will take place, and (3) at what density or floor area ratio (FAR).

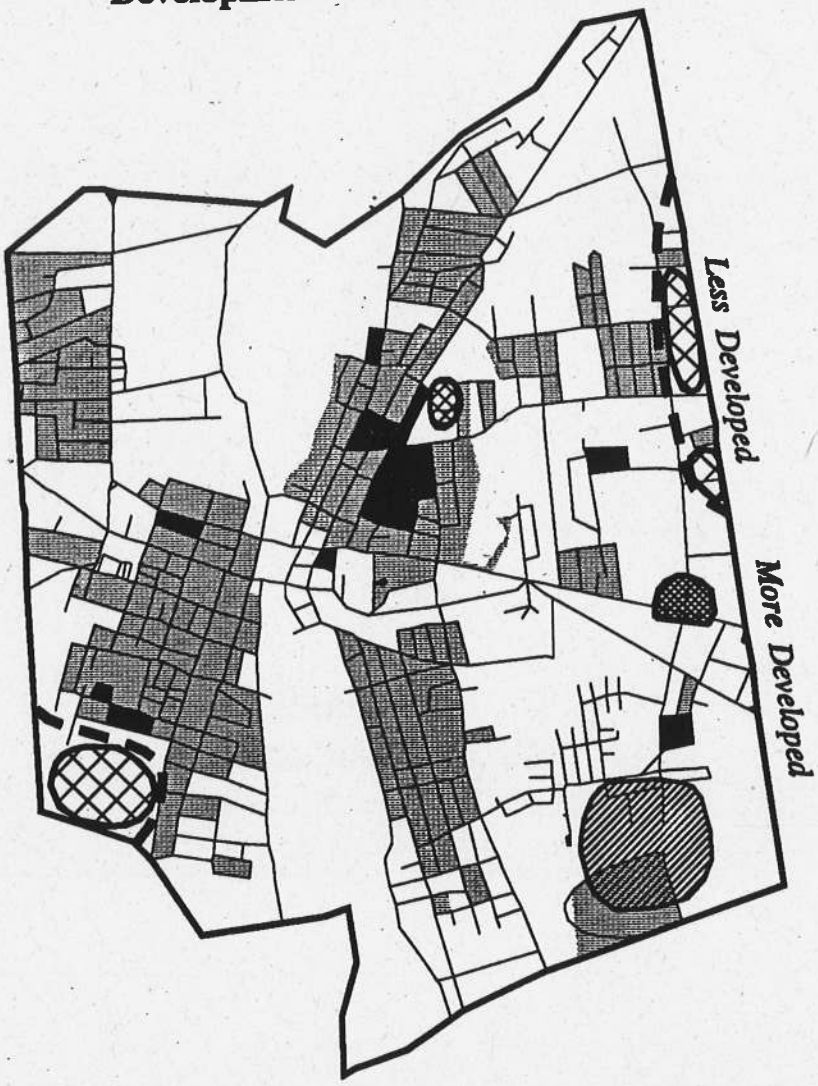
A. Information is also available on agricultural and frail land loss per acre and housing costs by type of unit in the community. In the first case the *rate* of agricultural and frail land loss per consumed acre will be the same under each scenario of growth; differences in consumption of agricultural and frail lands are a function of the overall amount of land consumed under each scenario. If growth under the CCMP uses less overall land, its agricultural and frail land losses will also be less.

B. Housing costs under both scenarios start out similarly and are adjusted according to the amount of land utilized per unit for development under each scenario. The land portion of housing costs is adjusted in a non-linear fashion to account for cost increases/decreases relative to the consumption of land for development purposes. Land cost is added to structure cost under each scenario to determine overall housing costs.

NEW JERSEY
STUDY COMMUNITIES

Bridgeton City, NJ

Development Patterns - Status Quo



KEY

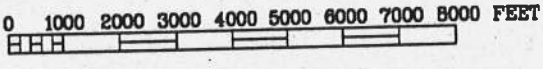
- Roads
- Less Developed/ More Developed Demarcation Line

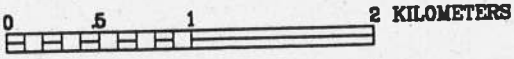
Existing Residential Development

- Moderate – High Density (> 10 units/ac)
- Low Density (< 10 units/ac)
- Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

Future Residential Development

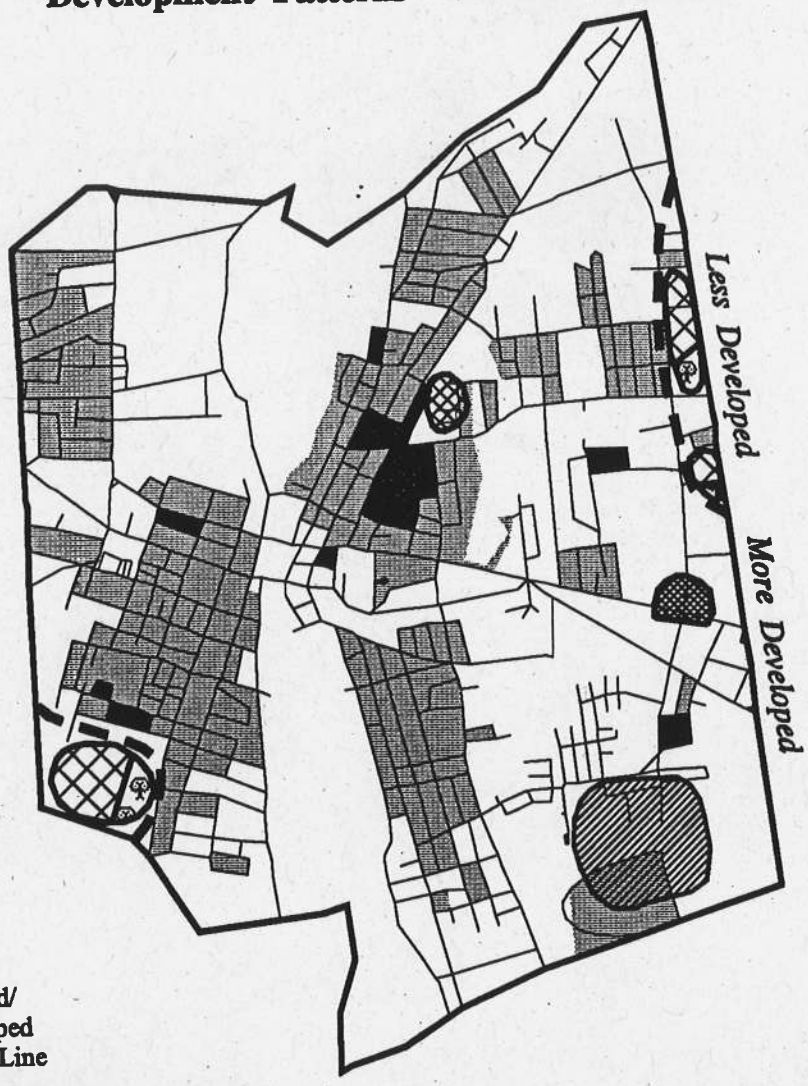
- Moderate Density (12 – 22 units/ac)
- Low Density (6 units/ac)
- Very Low Density (4 units/ac)
- ***Future Nonresidential Development*** At Varying FARs





Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Bridgeton City, NJ
Development Patterns - DELEP - CCMP



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 10 units/ac)

Low Density
(< 10 units/ac)

Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

Future Residential Development

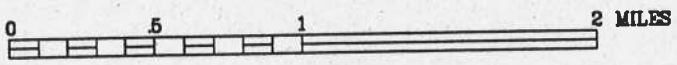
Moderate Density
(16 – 29 units/ac)

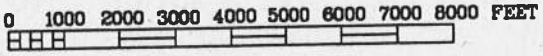
Low Density
(8 units/ac)

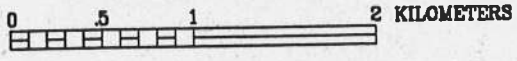
Very Low Density
(3 units/ac)

Preserved

Future Nonresidential Development
At Varying FARs

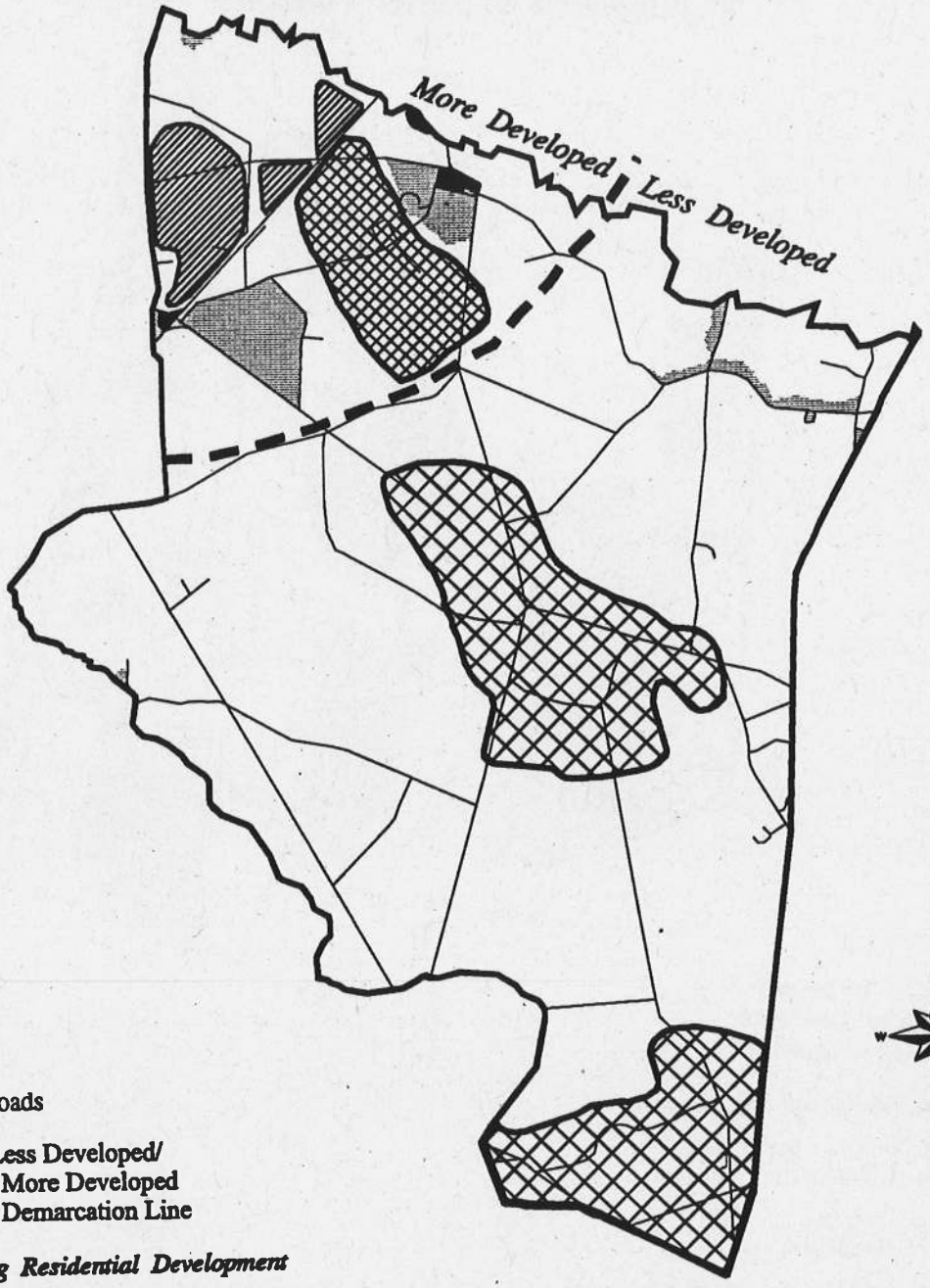






Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Chesterfield Township, NJ
Development Patterns - Status Quo



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 1 units/ac)

Low Density
(< 1 units/ac)

Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

Future Residential Development

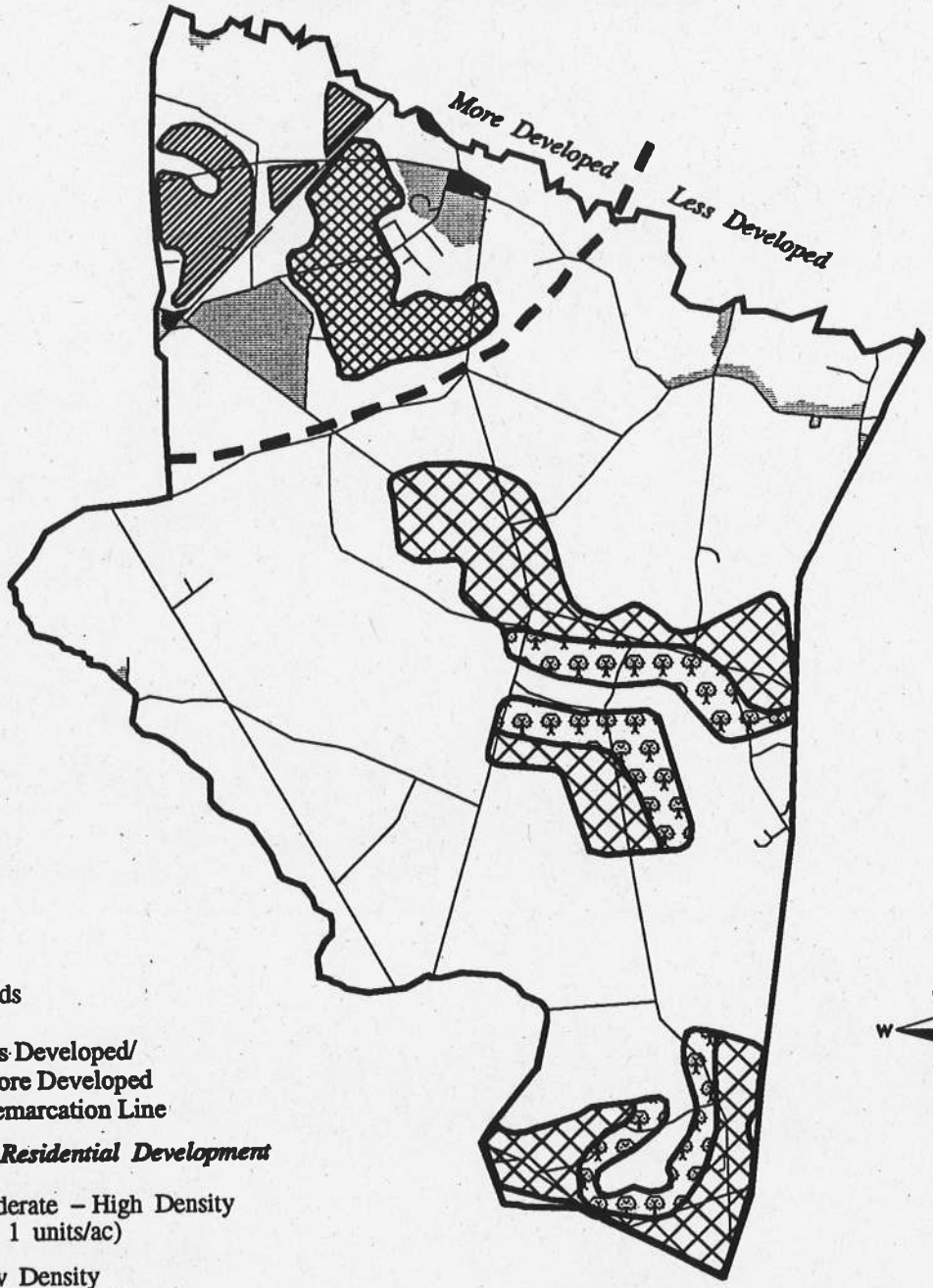
Low Density
(0.6 units/ac.)

Very Low Density
(0.3 units/ac)

Future Nonresidential Development
At Varying FARs

Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Chesterfield Township, NJ
Development Patterns - DELEP - CCMP



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 1 units/ac)

Low Density
(< 1 units/ac)

Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

Future Residential Development

Low Density
(1 units/ac)

Very Low Density
(0.2 units/ac)

Preserved

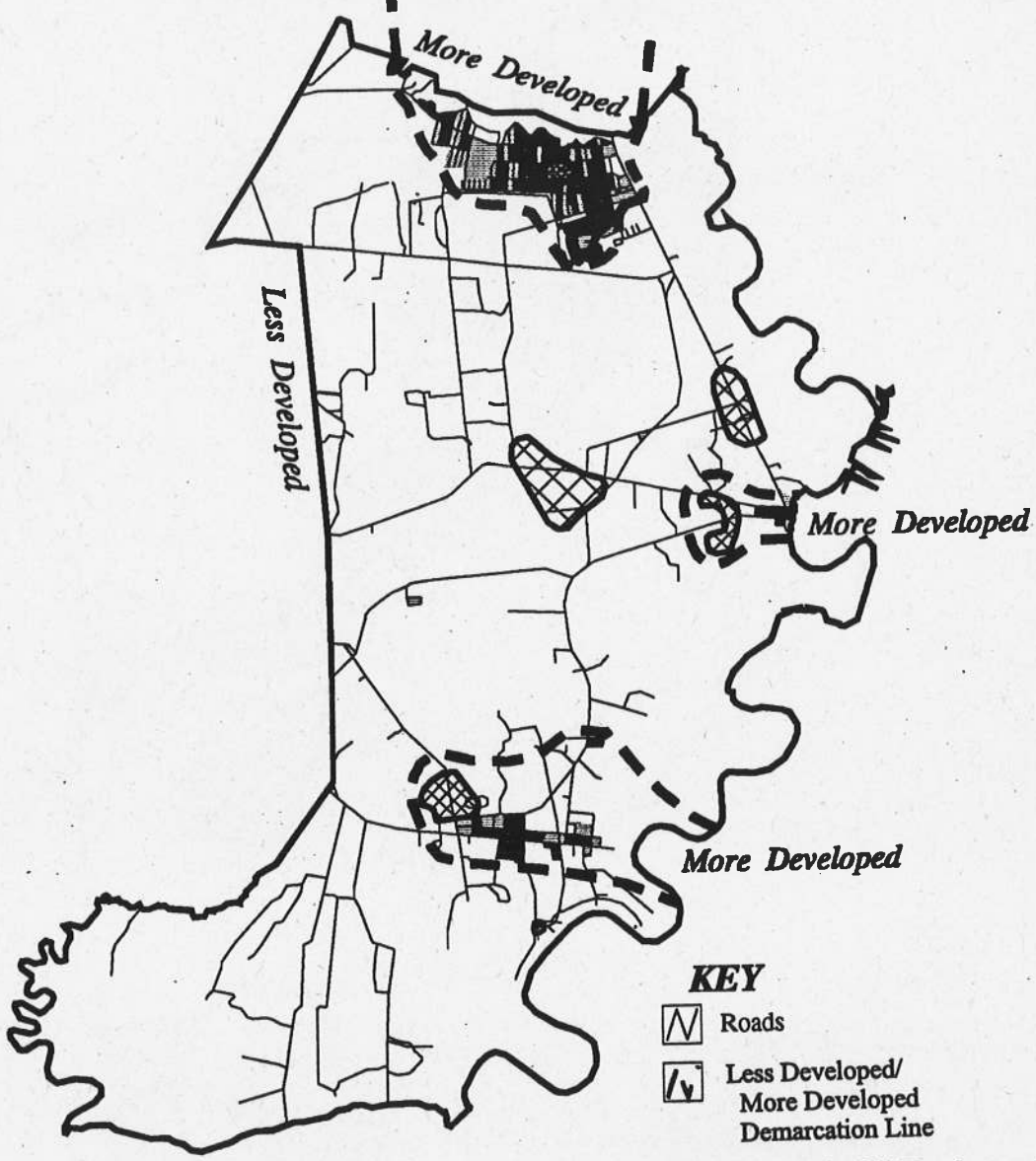
Future Nonresidential Development
At Varying FARs

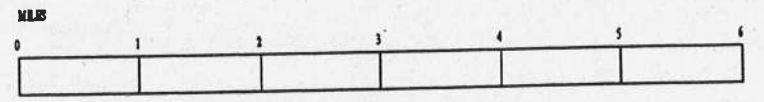
N
W E
S

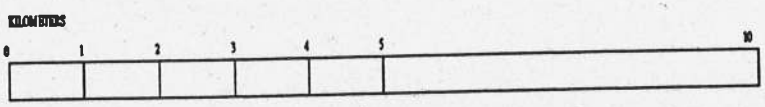
0 1 2 MILES
0 1000 2000 3000 4000 5000 6000 7000 8000 FEET
0 1 2 KILOMETERS

Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Commercial Township, NJ
Development Patterns - Status Quo







KEY

- Roads
- Less Developed/ More Developed Demarcation Line

Existing Residential Development

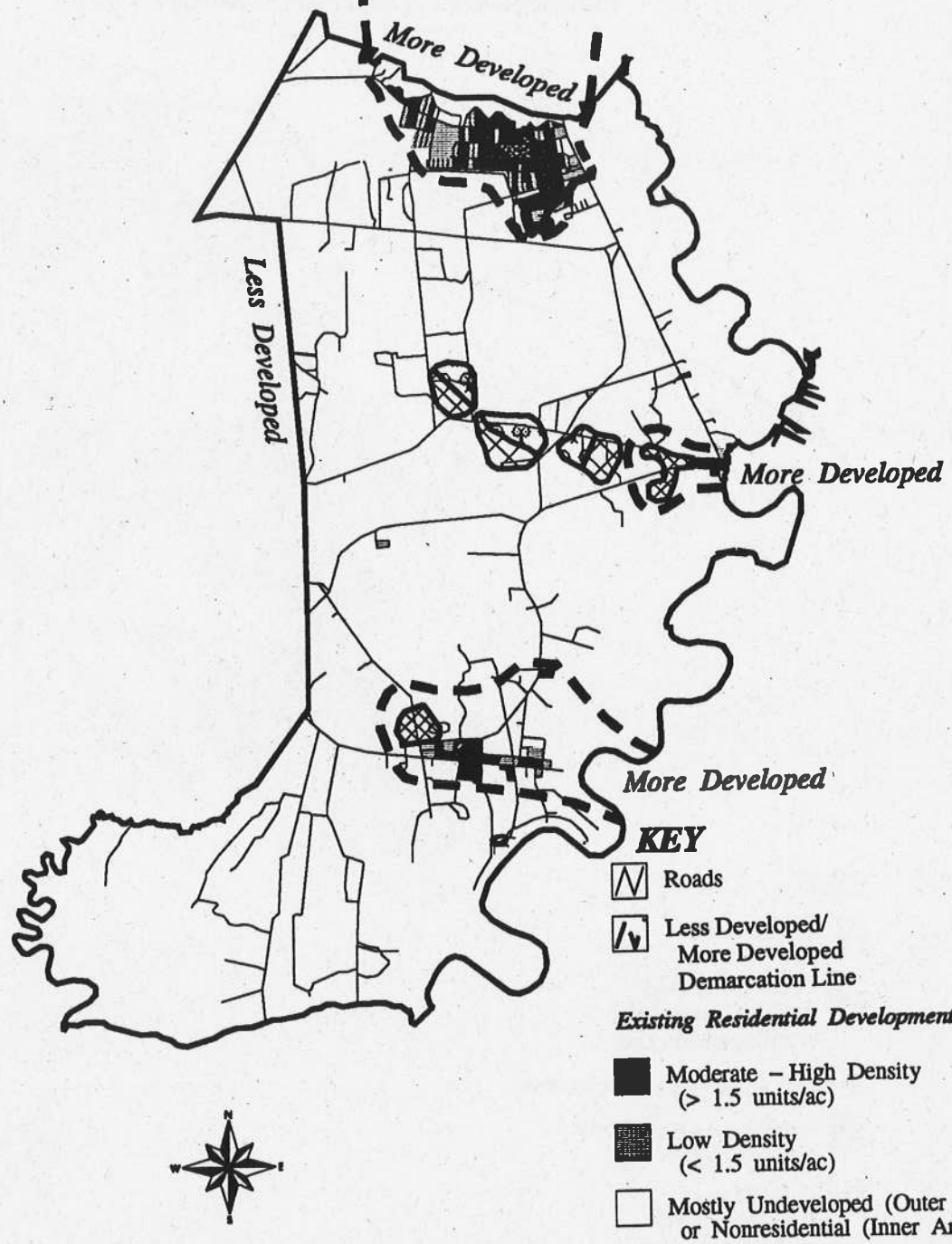
- Moderate – High Density (> 1.5 units/ac)
- Low Density (< 1.5 units/ac)
- Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

Future Residential Development

- Moderate Density (5 units/ac)
- Low Density (3 units/ac)
- Very Low Density (1 units/ac)
- ***Future Nonresidential Development*** At Varying FARs

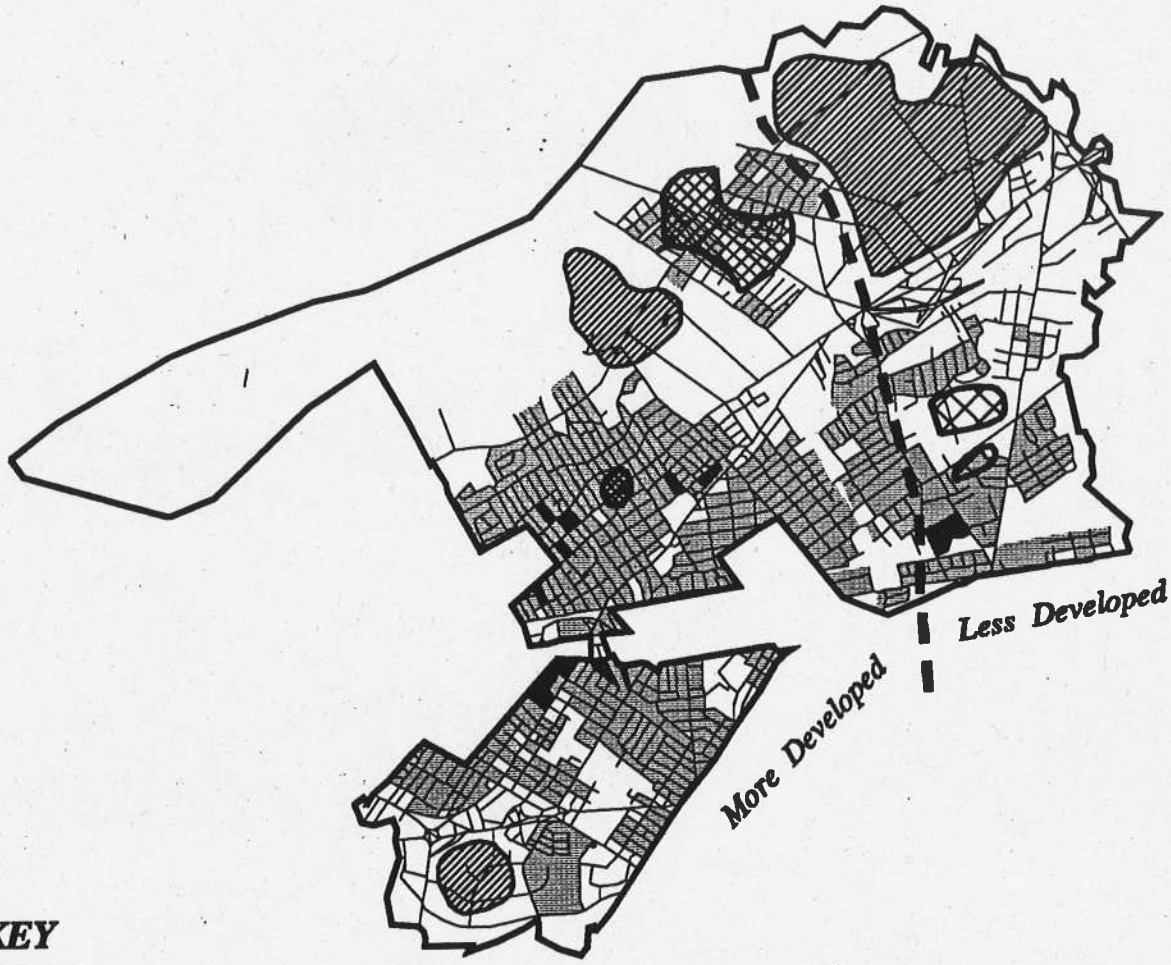
Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Commercial Township, NJ
Development Patterns - DELEP - CCMP



Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Pennsauken City, NJ
Development Patterns - Status Quo



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 10 units/ac)

Low Density
(< 10 units/ac)

Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

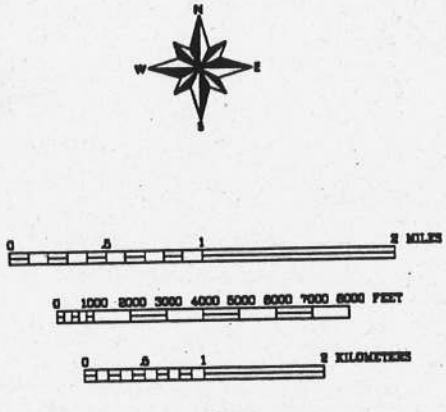
Future Residential Development

Moderate Density
(10 units/ac)

Low Density
(8 units/ac)

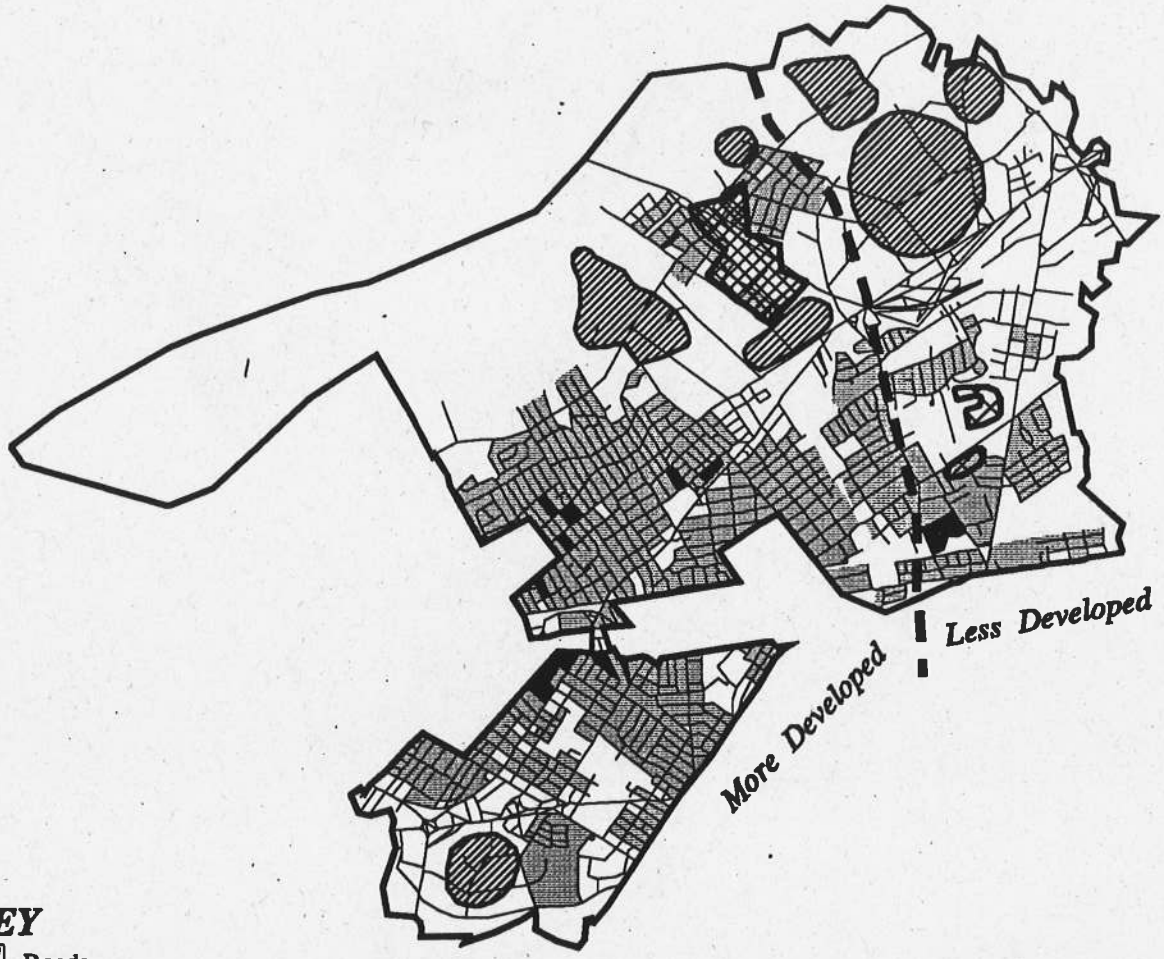
Very Low Density
(10 units/ac)

Future Nonresidential Development
At Varying FARs



Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Pennsauken City, NJ
Development Patterns - DELEP - CCMP



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 10 units/ac)

Low Density
(< 10 units/ac)

Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

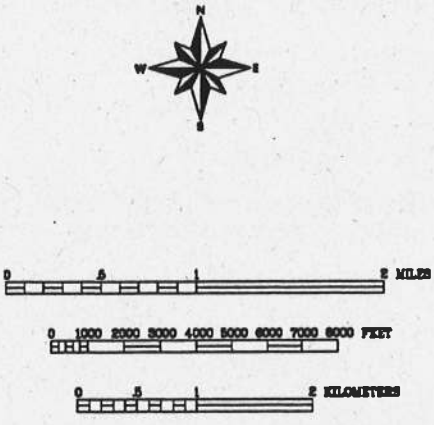
Future Residential Development

Moderate Density
(13 units/ac)

Low Density
(10.5 units/ac)

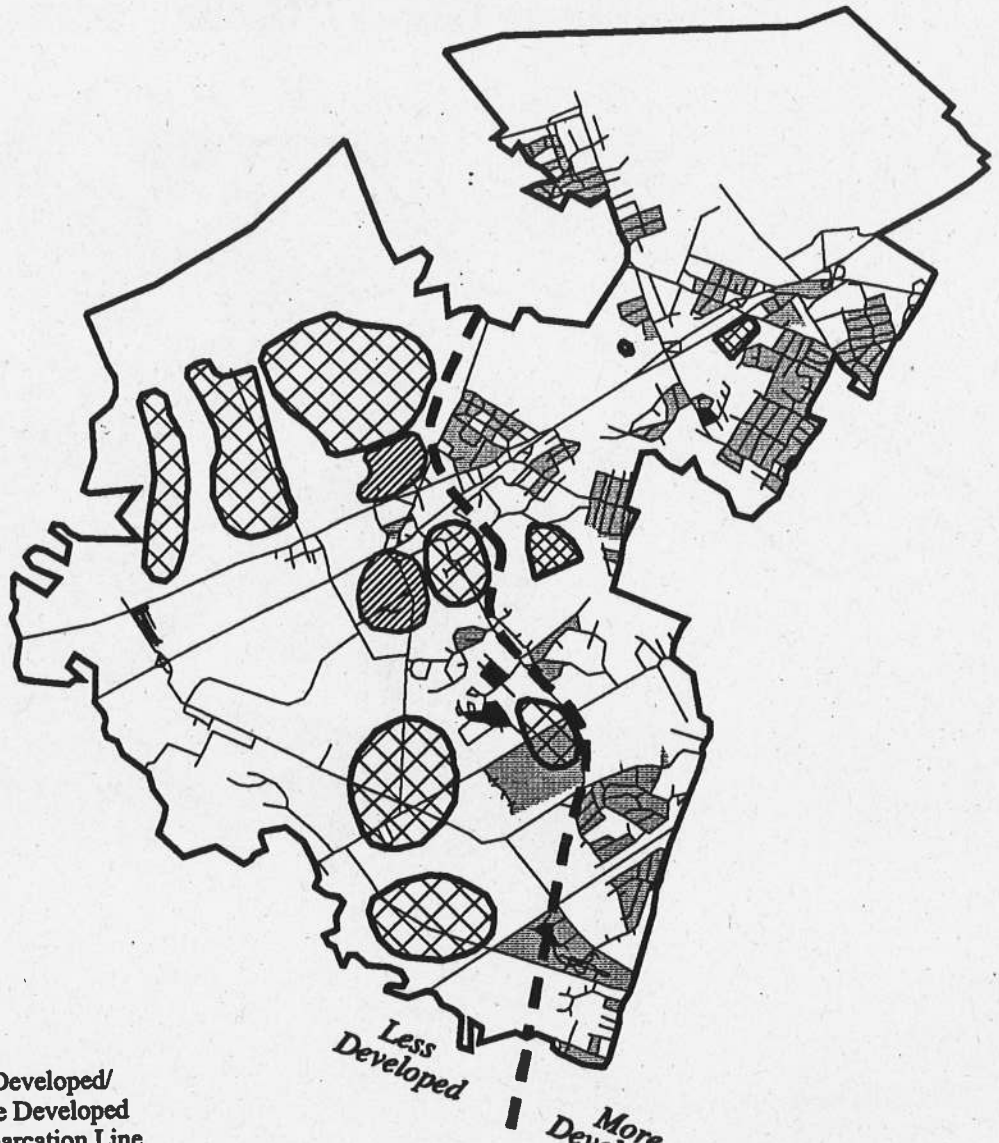
Very Low Density
(12 units/ac)

Future Nonresidential Development
At Varying FARs



Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

West Deptford Township, NJ
Development Patterns - Status Quo



KEY

Roads

Less Developed/ More Developed Demarcation Line

Existing Residential Development

Moderate – High Density (> 10 units/ac)

Low Density (< 10 units/ac)

Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

Future Residential Development

Moderate Density (10 – 20 units/ac)

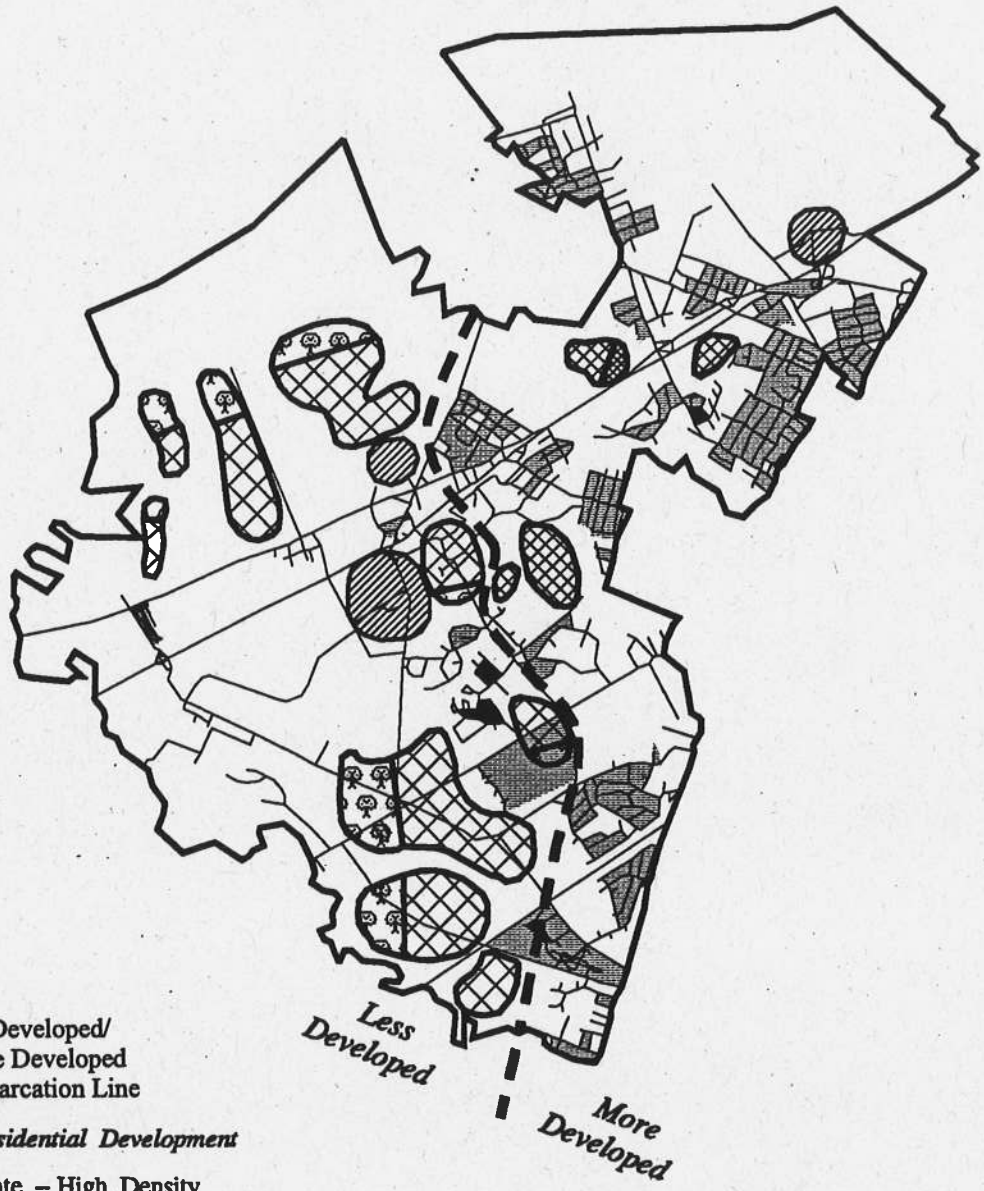
Low Density (4 units/ac)

Very Low Density (2 units/ac)

Future Nonresidential Development At Varying FARs

Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

West Deptford Township, NJ
Development Patterns - DELEP - CCMP



KEY

Roads

Less Developed/ More Developed Demarcation Line

Existing Residential Development

Moderate – High Density (> 10 units/ac)

Low Density (< 10 units/ac)

Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

Future Residential Development

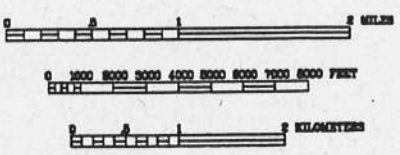
Moderate Density (13 – 26 units/ac)

Low Density (5 units/ac)

Very Low Density (1.5 units/ac)

Preserved

Future Nonresidential Development At Varying FARs

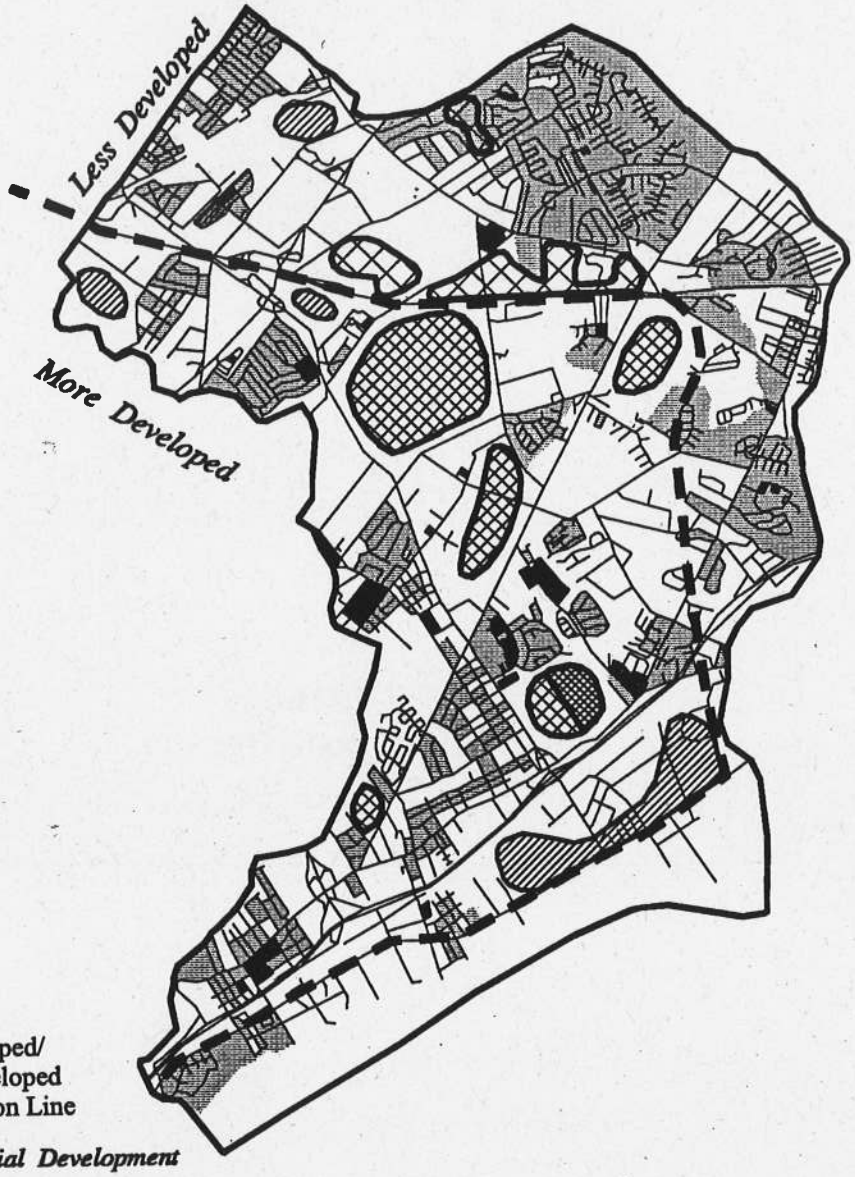


Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

PENNSYLVANIA STUDY COMMUNITIES

Bensalem Township, PA

Development Patterns - Status Quo



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 10 units/ac)

Low Density
(< 10 units/ac)

Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

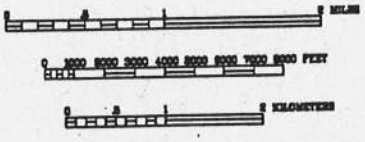
Future Residential Development

Moderate Density
(10 – 20 units/ac)

Low Density
(3 units/ac)

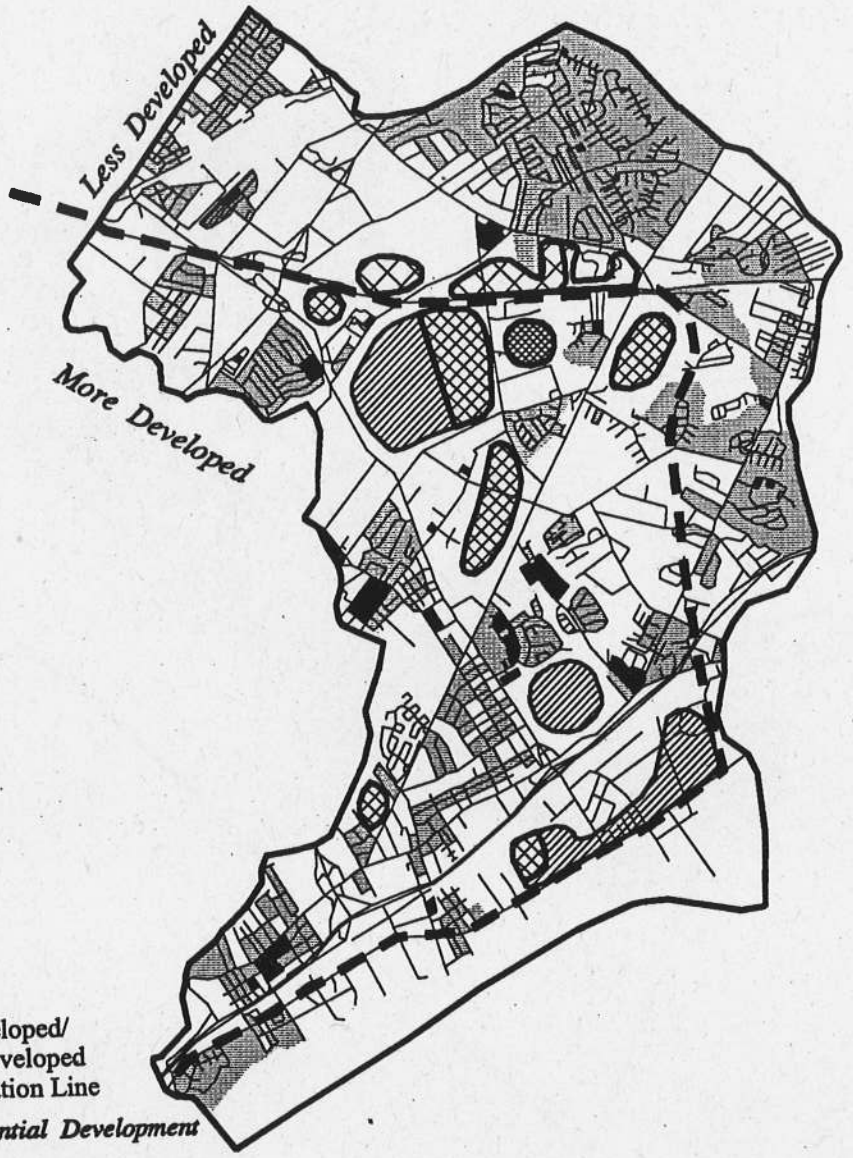
Very Low Density
(2 units/ac)

Future Nonresidential Development
At Varying FARs



Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Bensalem Township, PA
Development Patterns - DELEP - CCMP



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 10 units/ac)

Low Density
(< 10 units/ac)

Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

Future Residential Development

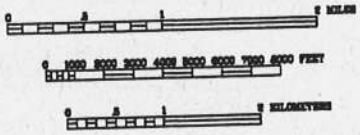
Moderate Density
(14 – 23 units/ac)

Low Density
(4 units/ac)

Very Low Density
(1.5 units/ac)

Preserved

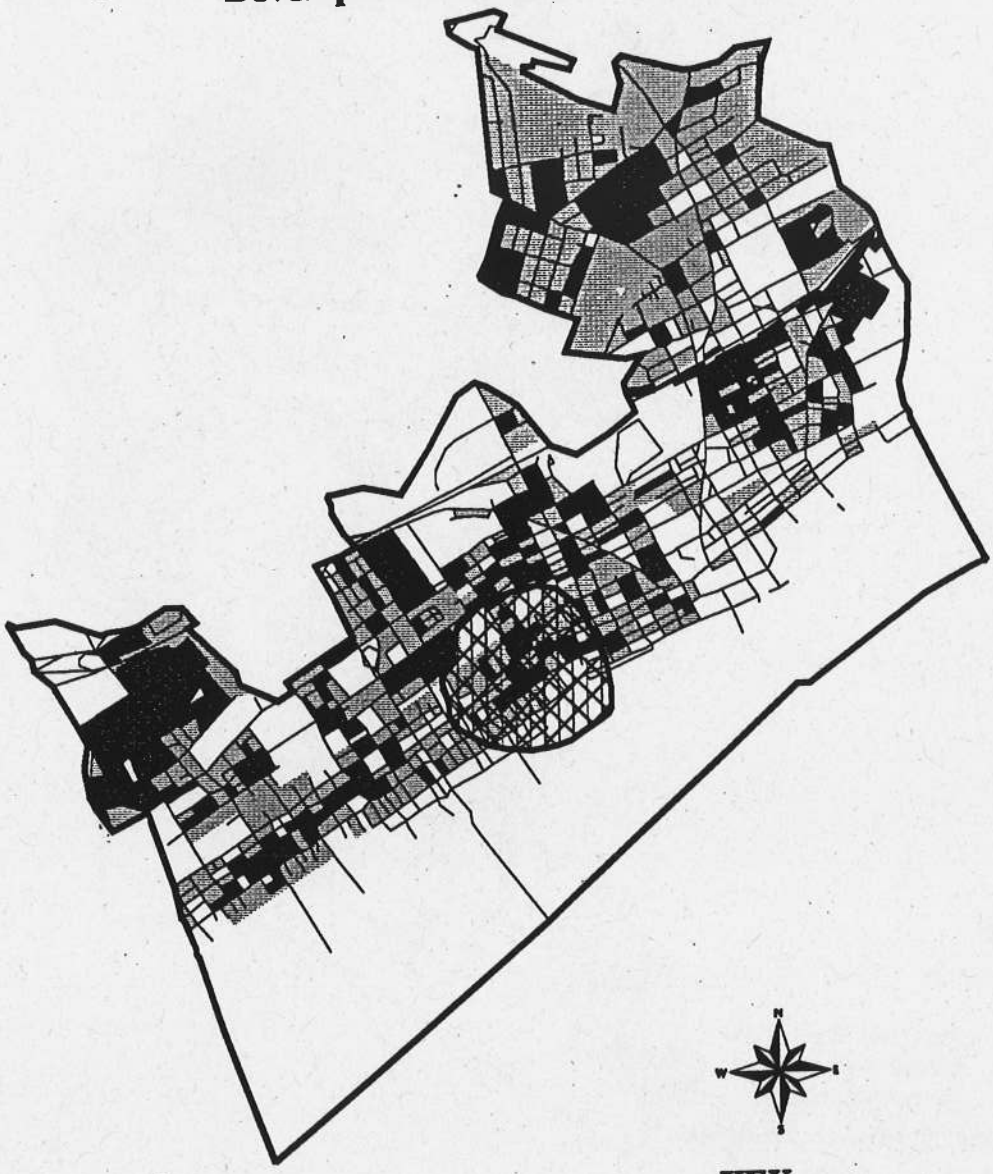
Future Nonresidential Development
At Varying FARs



Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Chester City, PA

Development Patterns - Status Quo



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

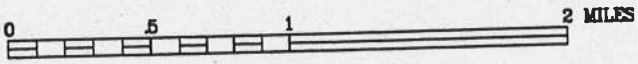
Moderate – High Density
(> 10 units/ac)

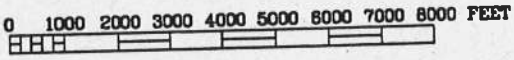
Low Density
(< 10 units/ac)

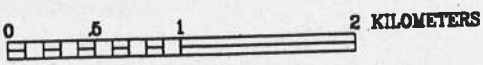
Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

Future Residential Development

Loss

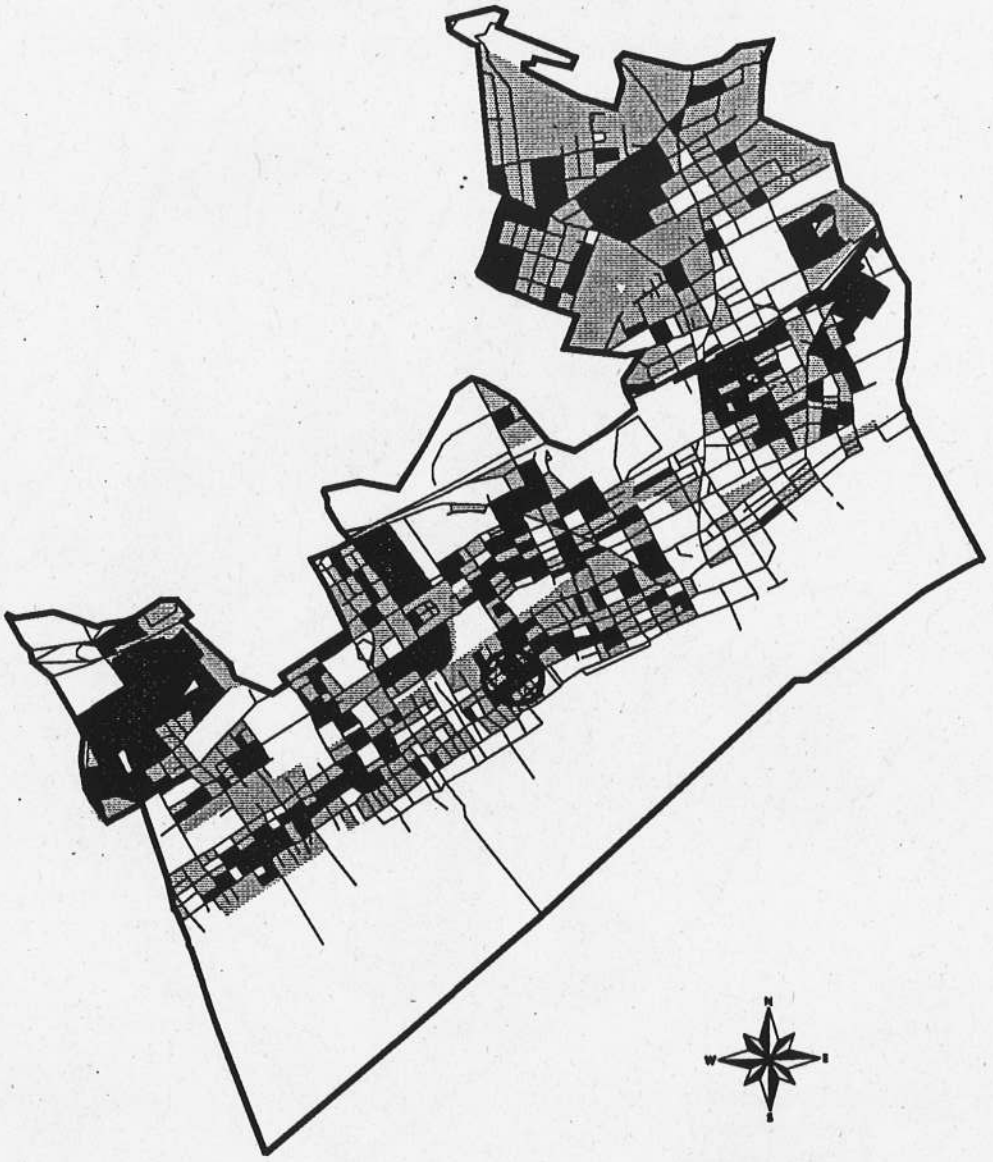


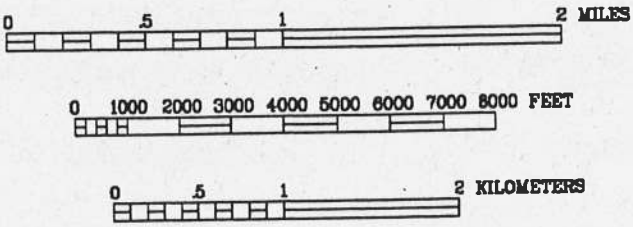




Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Chester City, PA
Development Patterns - DELEP - CCMP





KEY

Roads

Less Developed/ More Developed Demarcation Line

Existing Residential Development

Moderate – High Density (> 10 units/ac)

Low Density (< 10 units/ac)

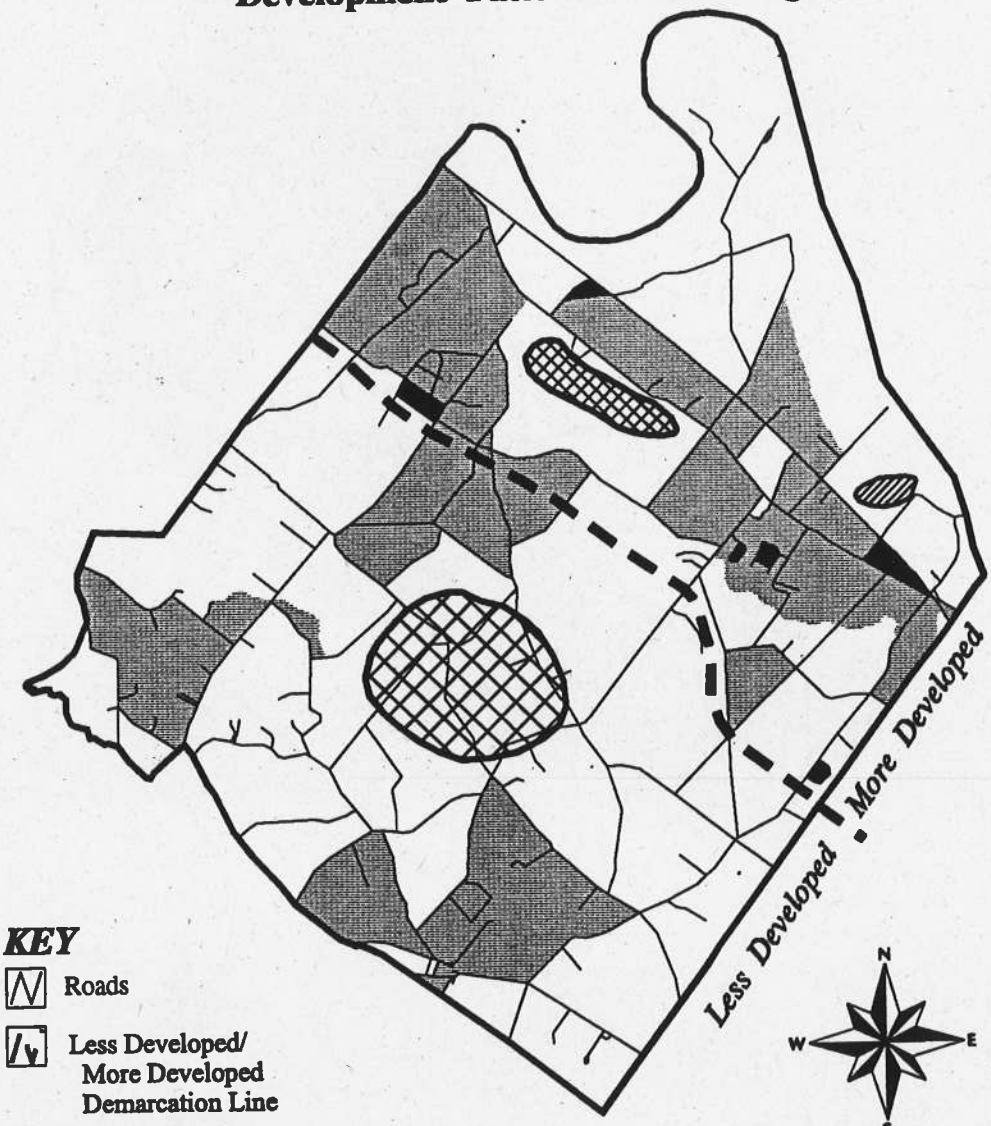
Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

Future Residential Development

Loss

Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

East Coventry Township, PA
Development Patterns - Status Quo



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 1 units/ac)

Low Density
(< 1 units/ac)

Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

Future Residential Development

Low Density
(0.75 units/ac)

Very Low Density
(0.5 units/ac)

Future Nonresidential Development
At Varying FARs

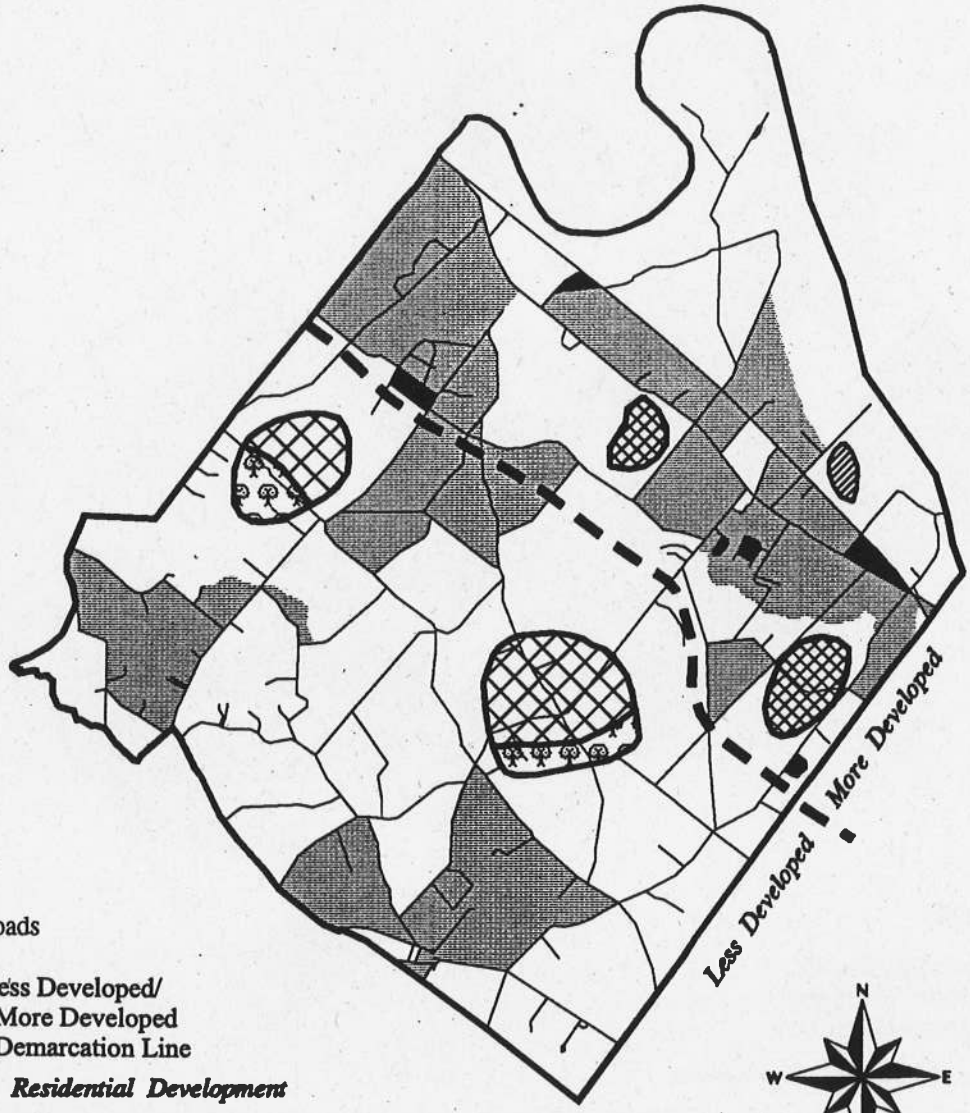
0 .5 1 2 MILES

0 1000 2000 3000 4000 5000 6000 7000 8000 FEET

0 .5 1 2 KILOMETERS

Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

East Coventry Township, PA
Development Patterns - DELEP - CCMP



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 1 units/ac)

Low Density
(< 1 units/ac)

Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

Future Residential Development

Low Density
(1 units/ac)

Very Low Density
(0.33 units/ac)

Preserved

Future Nonresidential Development
At Varying FARs

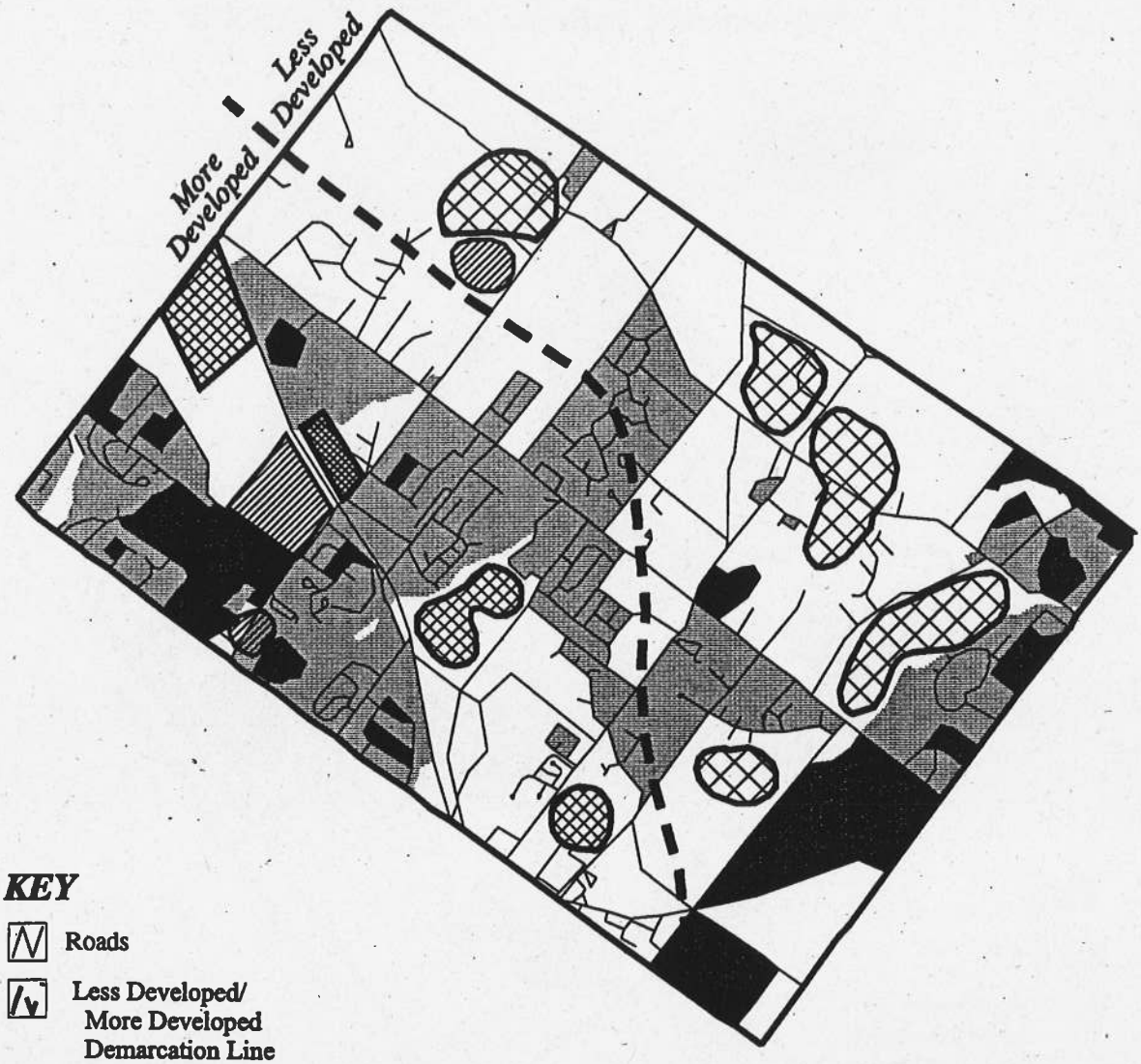
0 .5 1 2 MILES

0 1000 2000 3000 4000 5000 6000 7000 8000 FEET

0 .5 1 2 KILOMETERS

Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Whitpain Township, PA
Development Patterns - Status Quo



KEY

Roads

Less Developed/ More Developed Demarcation Line

Existing Residential Development

Moderate – High Density (> 1.5 units/ac)

Low Density (< 1.5 units/ac)

Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

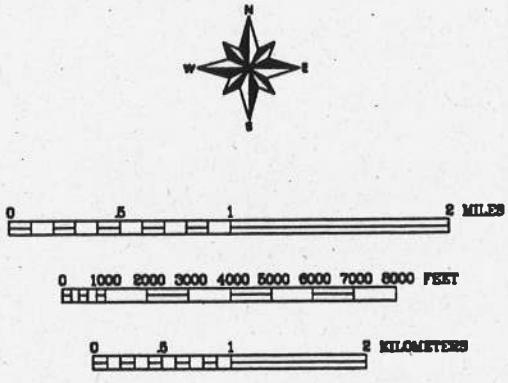
Future Residential Development

Moderate Density (8 units/ac)

Low Density (3 units/ac)

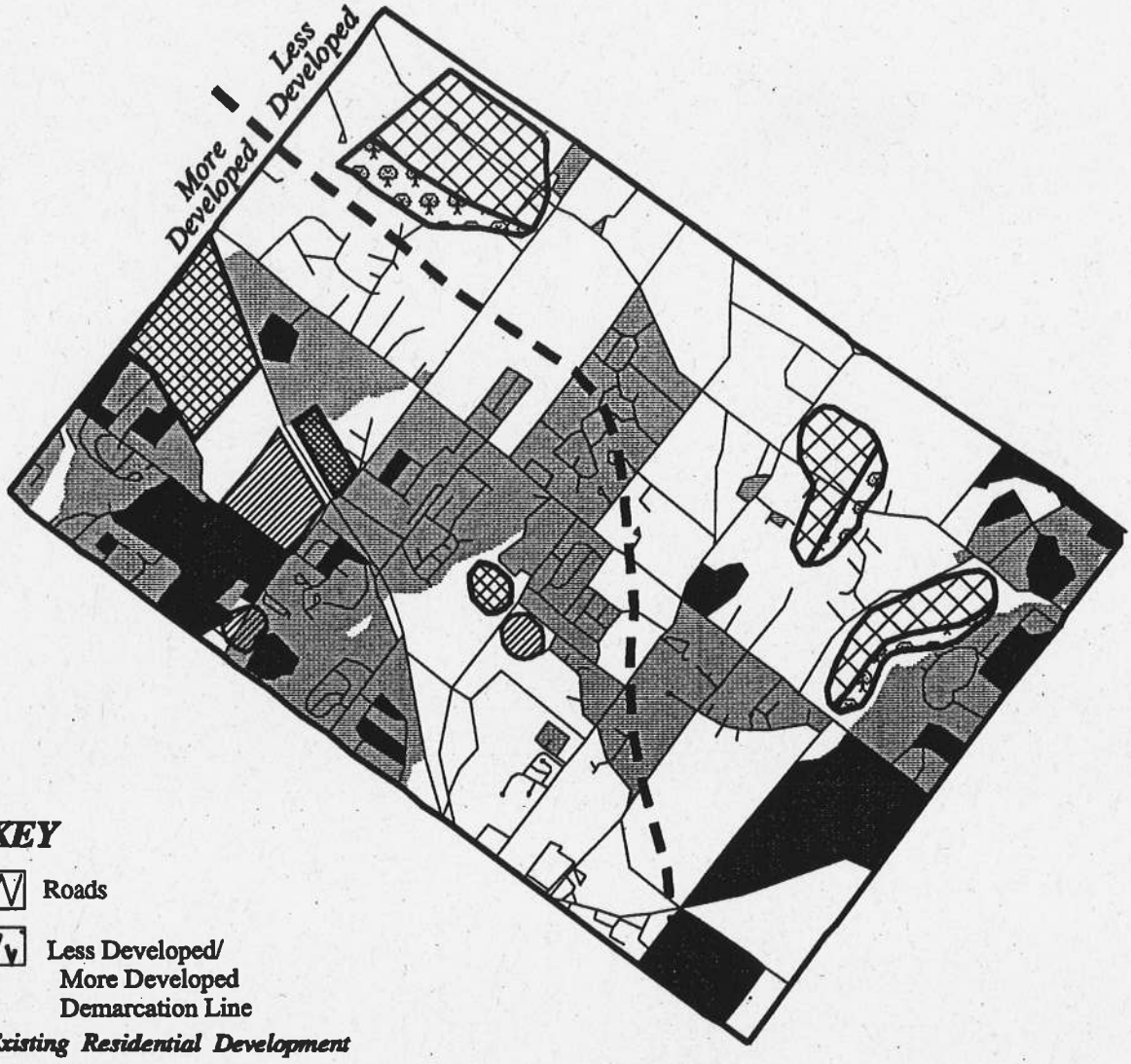
Very Low Density (3 units/ac)

Future Nonresidential Development At Varying FARs



Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Whitpain Township, PA
Development Patterns - DELEP - CCMP



KEY

Roads

Less Developed/ More Developed Demarcation Line

Existing Residential Development

Moderate – High Density (> 1.5 units/ac)

Low Density (< 1.5 units/ac)

Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

Future Residential Development

Moderate Density (10 units/ac)

Low Density (4 units/ac)

Very Low Density (2 units/ac)

Preserved

Future Nonresidential Development At Varying FARs

N W E S

0 .5 1 2 MILES

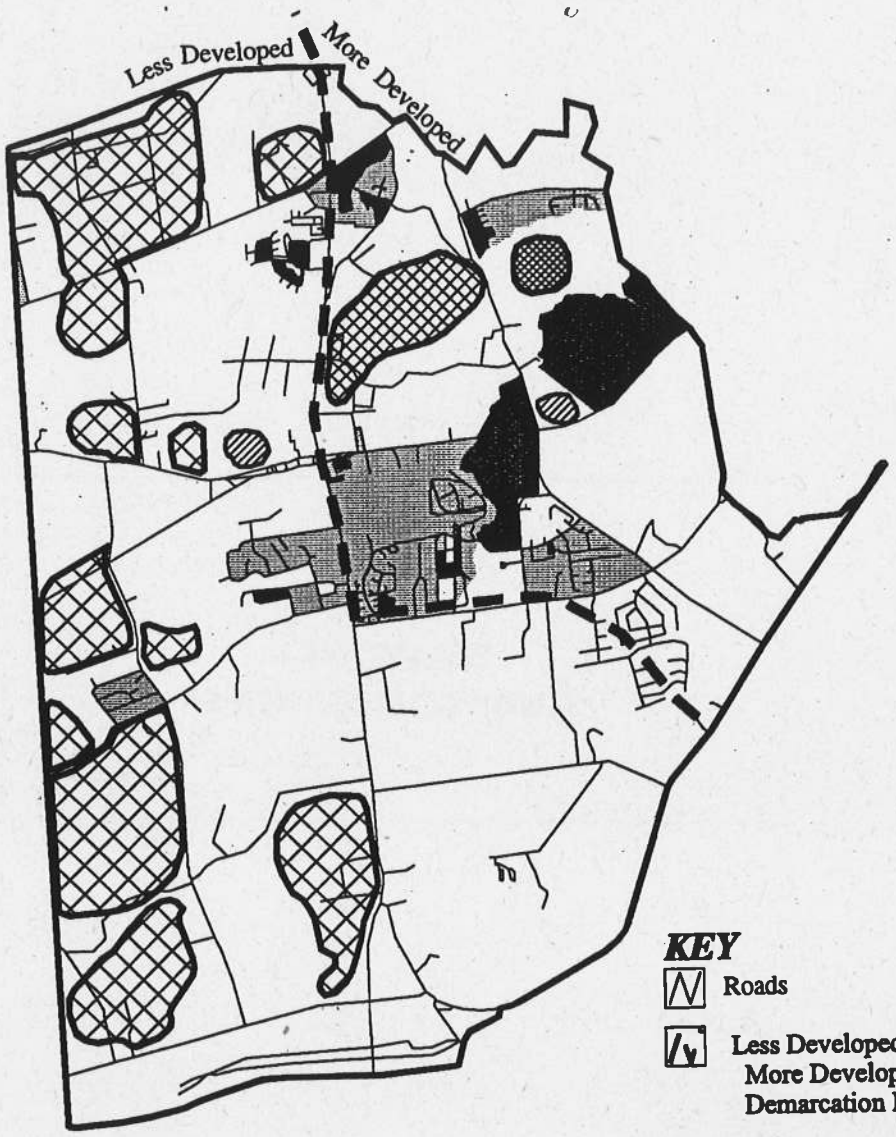
0 1000 2000 3000 4000 5000 6000 7000 8000 FEET

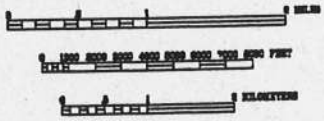
0 .5 1 2 KILOMETERS

Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

DELAWARE
STUDY COMMUNITIES

Central Pencader Division, DE
Development Patterns - Status Quo





KEY

Roads

Less Developed/ More Developed Demarcation Line

Existing Residential Development

Moderate – High Density (> 1.5 units/ac)

Low Density (< 1.5 units/ac)

Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

Future Residential Development

Moderate Density (10-20 units/ac)

Low Density (4.5 units/ac)

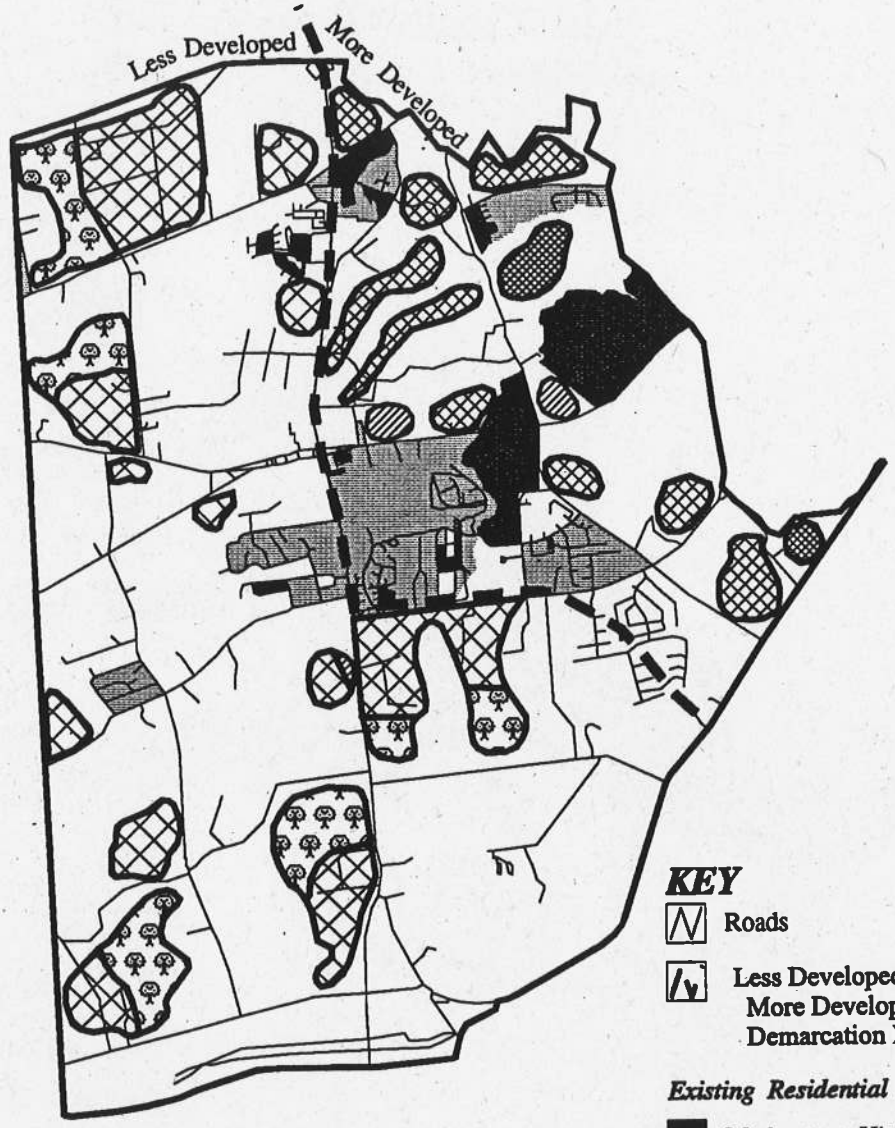
Very Low Density (3 units/ac)

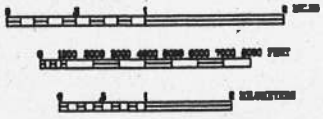
Future Nonresidential Development At Varying FARs

Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Central Pencader Division, DE

Development Patterns - DELEP - CCMP





KEY

Roads

Less Developed/ More Developed Demarcation Line

Existing Residential Development

Moderate – High Density (> 1.5 units/ac)

Low Density (< 1.5 units/ac)

Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

Future Residential Development

Moderate Density (13-26 units/ac)

Low Density (6 units/ac)

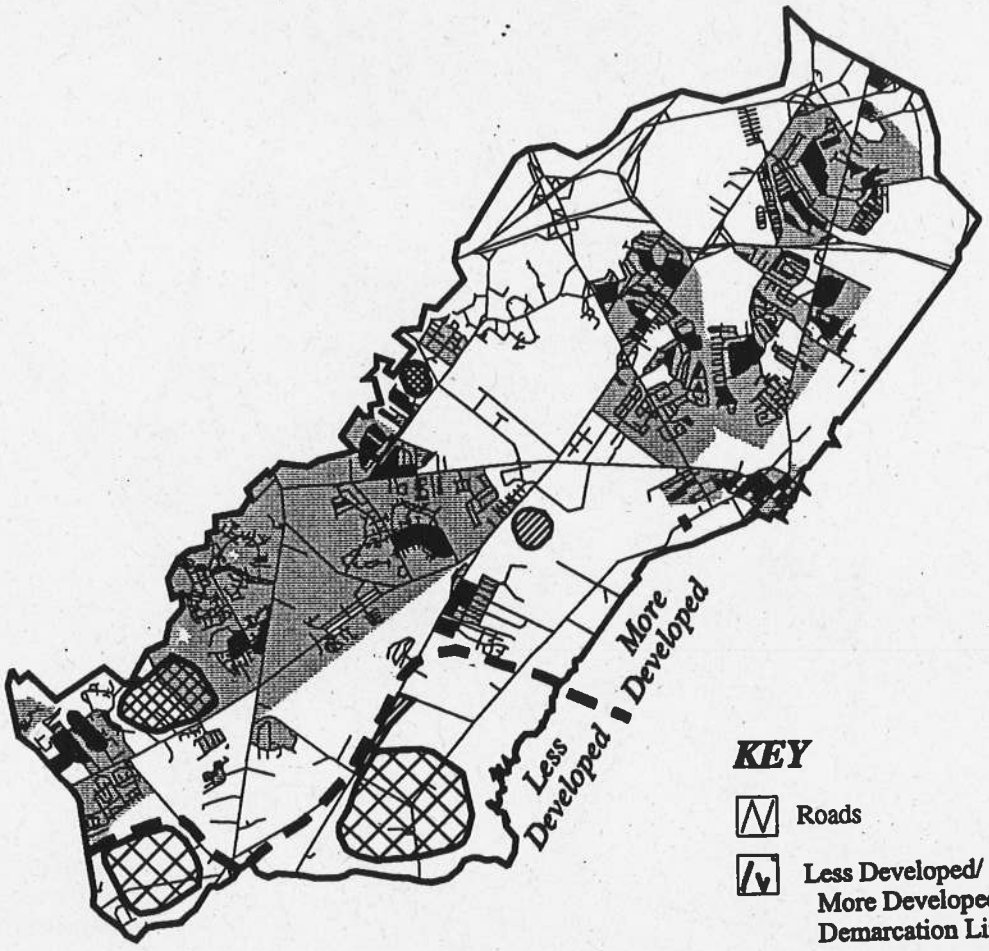
Very Low Density (2 units/ac)

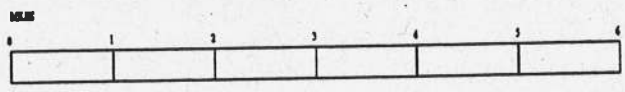
Preserved

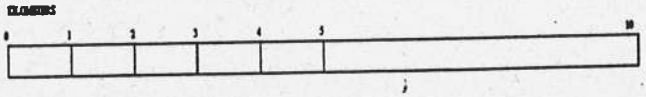
Future Nonresidential Development At Varying FARs

Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

New Castle Division, DE
Development Patterns - Status Quo







KEY

- Roads
- Less Developed/ More Developed Demarcation Line

Existing Residential Development

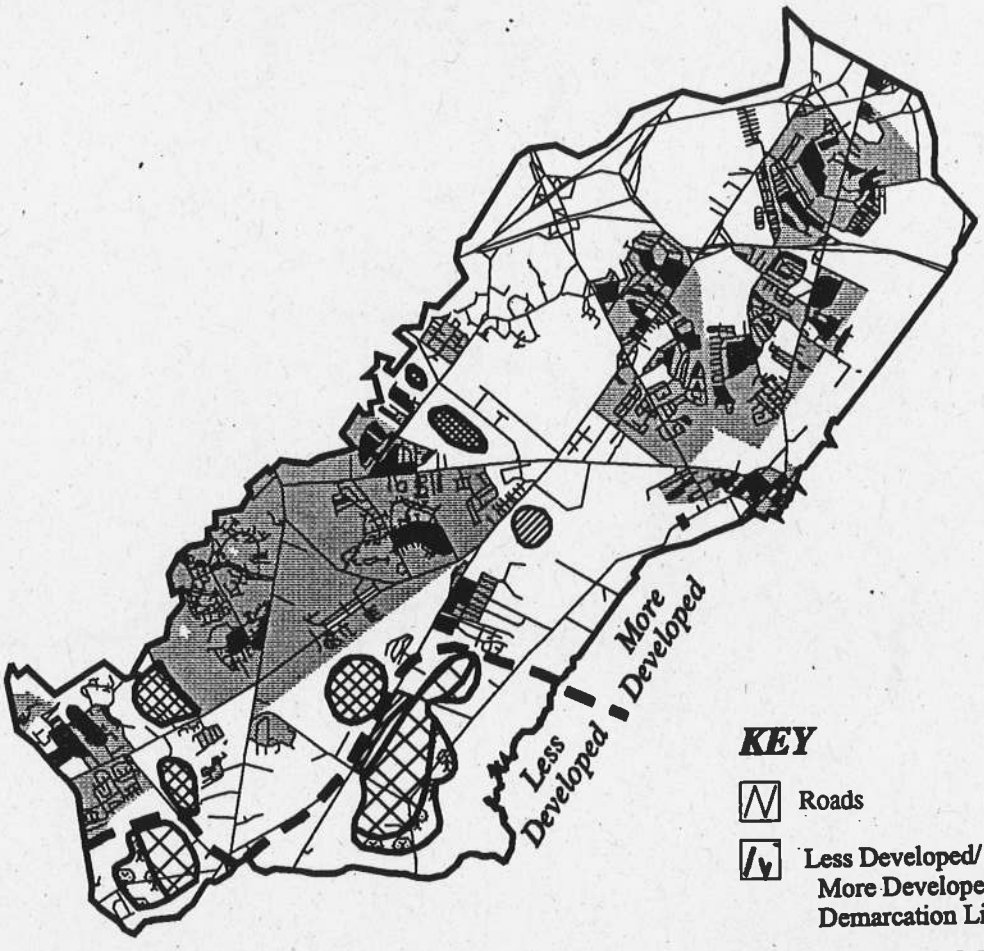
- Moderate – High Density (> 5 units/ac)
- Low Density (< 5 units/ac)
- Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

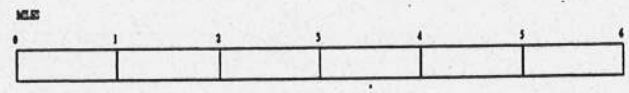
Future Residential Development

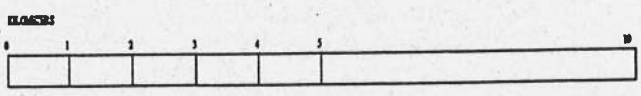
- Moderate Density (10 – 20 units/ac)
- Low Density (4.5 units/ac)
- Very Low Density (4 units/ac)
- ***Future Nonresidential Development*** At Varying FARs

Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

New Castle Division, DE
Development Patterns - DELEP -CCMP







Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

KEY

- Roads
- Less Developed/ More Developed Demarcation Line

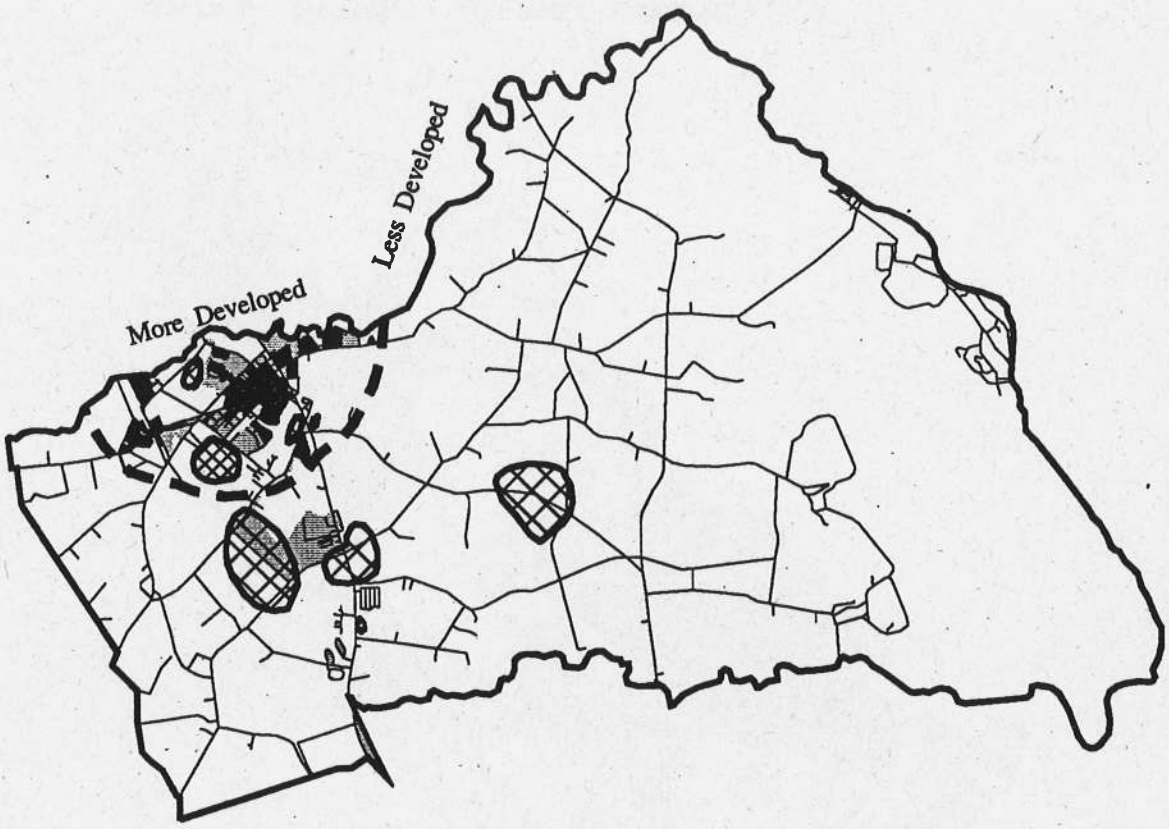
Existing Residential Development

- Moderate – High Density (> 5 units/ac)
- Low Density (< 5 units/ac)
- Mostly Undeveloped (Outer Areas) or Nonresidential (Inner Areas)

Future Residential Development

- Moderate Density (13 – 26 units/ac)
- Low Density (6 units/ac)
- Very Low Density (2.5 units/ac)
- Preserved
- ***Future Nonresidential Development*** At Varying FARs

Smyrna Division, DE
Development Patterns - Status Quo



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 1.5 units/ac)

Low Density
(< 1.5 units/ac)

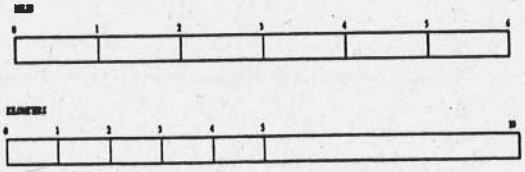
Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

Future Residential Development

Low Density
(3 units/ac)

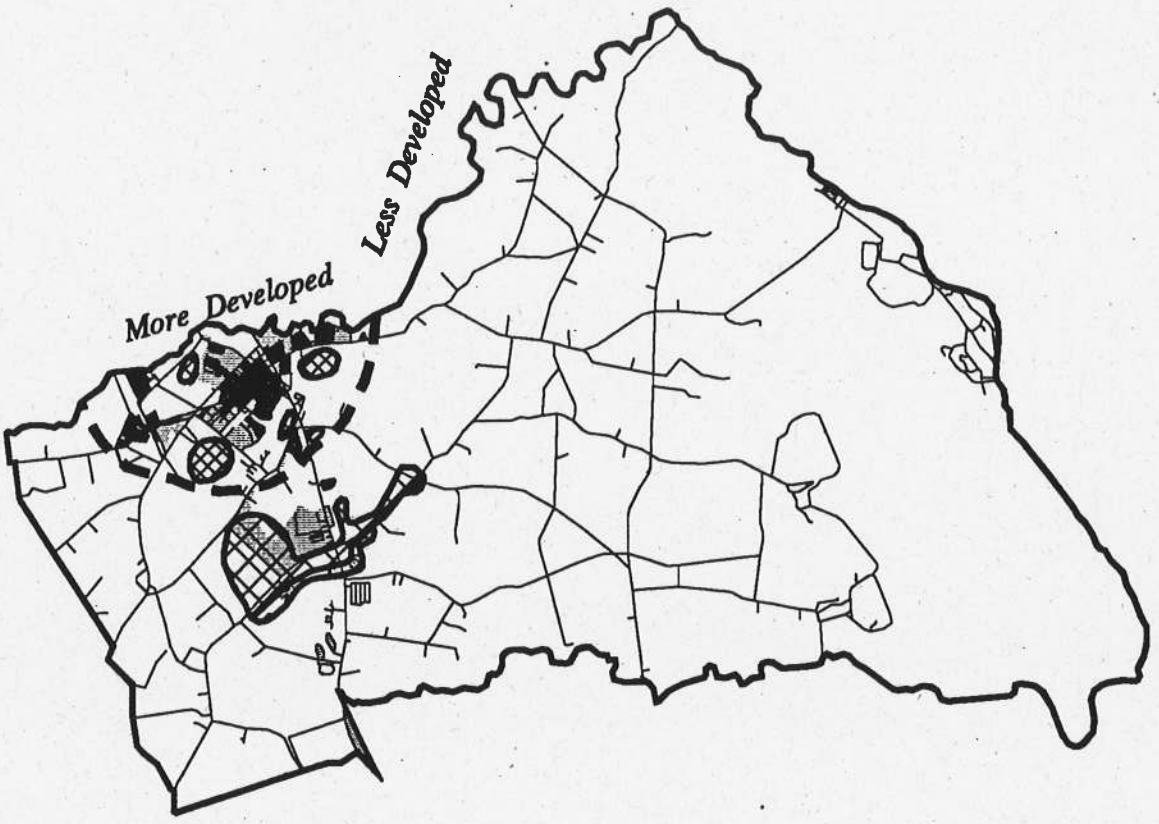
Very Low Density
(1 units/ac)

Future Nonresidential Development
At Varying FARs



Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Smyrna Division, DE
Development Patterns - DELEP - CCMP



KEY

Roads

Less Developed/
More Developed
Demarcation Line

Existing Residential Development

Moderate – High Density
(> 1.5 units/ac)

Low Density
(< 1.5 units/ac)

Mostly Undeveloped (Outer Areas)
or Nonresidential (Inner Areas)

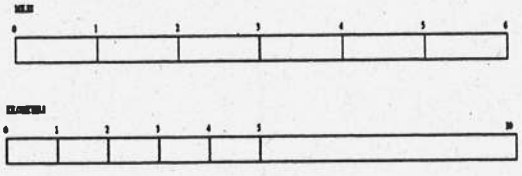
Future Residential Development

Low Density
(4 units/ac)

Very Low Density
(0.5 – 1 units/ac)

Preserved

Future Nonresidential Development
At Varying FARs



Source: Rutgers University Center for Urban Policy Research
Center for Remote Sensing & Spatial Analysis
US Fish & Wildlife Service

Section III

THE POTENTIAL SAVINGS OF PLANNED VERSUS TRADITIONAL DEVELOPMENT

—

FINDINGS OF THE FIELD

INTRODUCTION

This section of the report examines the literature of the growth management experience to classify and analyze what has been found by the field in terms of growth management's effect on land and infrastructure consumption as well as local housing and public service costs. Do the patterns of development spawned by the procedures of growth management actually reduce land consumption and save infrastructure costs? Do they in the process drive up housing costs? Do they have an effect on public service costs? This is the focus of Section III. The section examines the implications of planned or CCMP growth versus more traditional, or STATUS QUO, development on the four areas discussed above. *Land consumption* involves the use of land to accommodate development, with the focus on overall land converted to development as well as the drawdown of agricultural acreage and the intrusion of development onto frail environmental lands. *Infrastructure* includes the capital improvements necessitated by growth encompassing roads, utilities, schools, and other facilities (e.g., town hall, fire and EMS stations). *Housing costs* are typically considered on a cost per residential unit basis for a variety of shelter accommodations, such as single-family detached and attached homes, townhouses, garden units, and the like. *Fiscal impacts* involve directing development to areas of excess service capacity and away from those locations that would have to expand public infrastructure. Fiscal impacts thus involve capital improvement savings initially achieved, as well as longer-run savings in operating costs relative to where development takes place, both regionally and in a single community.

Development affects all of these impact situations. Land is taken, infrastructure is provided, a shelter cost is derived, and public service costs emerge. The analysis that follows considers the comparative effects of development on land consumption, infrastructure needs, housing costs, and fiscal impacts if development follows a traditional, or STATUS QUO, pattern versus development that incorporates a higher level of planning or CCMP–inspired land-use patterns.

DEVELOPMENT PATTERNS AND LAND CONSUMPTION

In contrast to the considerable literature examining the relationship between development patterns and infrastructure, few studies exist that discuss, and even fewer that empirically investigate, how trend versus planned development affects land consumption. For instance, in the 1981 *National*

Agricultural Land Study, growth management was offered as a strategy to reduce the loss of farmland:

> In many parts of the country, the problem of agricultural protection can be addressed realistically and effectively only by considering its relation to the entire system of land use and development within a given region. . . . A coordinated regional approach to growth management can accomplish a variety of mutually complementary objectives, such as minimizing public investment costs and focusing farmland preservation efforts on areas where agriculture is most likely to remain economically viable over the long run. Therefore, ideally, a growth management strategy should consider functional and spatial interrelationships at the regional as well as the local level. (Coughlin and Keene 1981, 26)

More recently, many growth management plans have emphasized the goal and ability of managed growth to reduce land consumption, especially the loss of farmland. As an example, the Vermont Growth Management Act of 1988 (Act 200) states as one of its purposes "to protect . . . agricultural areas . . . from the loss of peace and quiet and privacy" (Vermont 1988). To this end, regional plans and approved municipal plans must be consistent with the state goals listed in Act 200. One of these goals is that "important and economically viable agricultural and forest lands shall be protected" (Vermont 1988). In a similar fashion, farmland preservation is incorporated in Maine's Comprehensive Planning and Land Use Regulation Act of 1988. One of the ten goals of the plan is to "safeguard the state's agricultural and forest resources from development which threatens these resources" (Maine 1988). Municipalities are then directed to follow certain guidelines, one of which states that they must "ensure the protection of agricultural and forest resources and discourage new development that is incompatible with uses related to the agricultural and forest industry" (Maine 1988).

Reduced land consumption is emphasized in the New Jersey State Planning Act. The Act specifically requires the New Jersey State Planning Commission to:

> coordinate planning activities and establish statewide planning objectives in . . . agriculture and farmland retention . . . and the State Development and Redevelopment Plan shall protect the natural resources and qualities of the State including, but not limited to, agriculture development areas, . . . and . . . identify areas for growth, limited growth, agriculture, open space conservation, and other appropriate designations that the Commission may deem necessary. (New Jersey State Planning Commission 1991, 80)

This framework was operationalized in the Amended Interim State Development and Redevelopment Plan and ultimately in the final State Plan (PLAN; Burchell et al. 1992b). In brief, land was classified into five planning areas (PAs) based on their current importance to the environmental quality and economy of the state. The five areas included:

PA1	Metropolitan Planning Areas
PA2	Suburban Planning Areas
PA3	Fringe Planning Areas
PA4	Rural Planning Areas
PA5	Environmentally Sensitive Planning Areas

Specific policies were directed toward each type of planning area. Thus, to reduce the agricultural land loss that had been occurring in PA4 and the encroachment on environmentally sensitive lands occurring in PA5 under prevailing growth patterns (TREND), PLAN directed growth away from these areas to PA2 and PA3.

LAND CONSUMPTION AND TREND VERSUS PLANNED GROWTH

What is the relative land consumption under traditional versus managed growth? The Rutgers University impact assessment conducted by Burchell et al. and described earlier addressed this question by examining the overall land consumption under the two development scenarios of TREND and PLAN and further considered the relative drawdown of agricultural acreage and impacts on frail lands (Burchell et al. 1992a, 1992b). Agricultural lands included such categories as cropland that is harvested, pastured lands in permanent pasture, and woodlands that could be used for agricultural purposes. Frail land encompassed floodplains and wetlands, acreage with steep slopes or with critical habitat designation, aquifer recharge areas and critical sensitive watersheds, and stream buffers. The results from the impact assessment of TREND versus PLAN are summarized in Table III–3 and described below.

The Rutgers analysis found that there was more than enough land statewide to accommodate the projected twenty-year development (1990-2010) of persons (520,000), households (431,000), and employees (654,000) under both traditional (TREND) and managed (PLAN) growth. As of 1990, there was a total of two million acres available for development in the state of New Jersey. Of these two million acres, development between 1990 and 2010 under TREND would

consume 292,079 acres, whereas PLAN would accommodate the same level of growth as TREND in terms of persons, households, and jobs indicated earlier yet would consume only 117,607 acres—175,000 fewer acres than TREND (Burchell et al. 1992b). Thus, PLAN's overall land drawdown was 60 percent less than TREND.

The impact assessment further found that managed growth would have the environmental advantages of preserving greater levels of frail and agricultural lands. Reflecting historical rates of loss, under TREND 36,482 acres of frail lands would be consumed for development. By contrast, under PLAN the consumption of these lands would drop to 7,150 acres, or 20 percent. Thus, managed growth in New Jersey could accommodate future development without spoiling more than 30,000 acres of frail environmental lands. In a similar vein, while 1990–2010 development under TREND would consume 108,000 agricultural acres, under PLAN, 66,000 agricultural acres would be drawn down, representing a savings of 42,000, or 40 percent of prime agricultural land.

Finally, the Rutgers University impact assessment found that the availability of land to accommodate growth was more than enough with respect to either growth scenario—traditional or planned, and further that significant levels of frail and agricultural lands could be preserved via planned development. The former finding does not at all minimize the beneficial effects of consuming less land for development.

DEVELOPMENT PATTERNS AND INFRASTRUCTURE COSTS

Proponents of planned or managed growth often describe the economic savings associated with this type of development as a prelude to the call for its adoption. For instance, a Florida study, after observing that "compact, infill, and higher density development is more efficient to serve than scattered, linear, and lower density sprawl," asked for state management that would foster the former development pattern (Duncan et al. 1989, 21). Similar statements appear in *The Costs of Sprawl* report, a study conducted two decades ago (Real Estate Research Corporation 1974), to more recent study and policy documents (see References following this section). The most comprehensive *recent* assessment of the economies afforded by planned development is that conducted by a team of academic and professional researchers from Rutgers University. This study was again the one that focused on the impacts of the then pending New Jersey State Development and Redevelopment Plan. Findings in this report indicated that the state of New Jersey could save $1.3 billion in infrastructure costs for roads, utilities, and schools over a twenty-year period if a state plan managing growth

were followed, as opposed to the sprawl patterns of development at that time (Burchell et al. 1992a). The Rutgers study was instrumental in fostering support for the plan, which ultimately was unanimously adopted by the New Jersey State Planning Commission in 1992.

The following discussion reviews the national literature with respect to land-use management and its economic implications, specifically its effects on infrastructure costs. While there are gaps in what is known, a number of studies support the contention that managed growth, by fostering compact, infill, and higher density development, can realize cost savings with respect to capital facility provision.

The planning literature has long been interested in the relationship between land use and infrastructure costs (Burchell and Listokin 1990, 75). Initially, most attention was paid to the association between density and on-site capital improvements, such as sidewalks, curbs, subdivision roadways, and so on. Not surprisingly, studies showed that the on-site infrastructure outlay per unit would be reduced as density increased, since the improvements would be "amortized" over a larger number of units. To illustrate, the cost for sidewalks would be roughly halved for single-family detached homes with fifty-foot frontages, compared to those with 100-foot frontages.

The planning literature recently has additionally considered the linkage between *off-site* capital improvements and the land-use development *pattern*. The former includes neighborhood and community-wide infrastructure—area roads, schools, utility plants, and so on. The latter—the pattern of development—is often contrasted between "trend" versus "plan" profiles. *Trend* or *STATUS QUO* is characterized by the prevailing sprawl pattern, as opposed to *plan* or *CCMP*, where somewhat more dense development on the one hand, and partially preserved areas on the other, prevails.

The pattern of development is not entirely distinct from density. Managed (planned) development may tend in some places toward somewhat higher urban densities, whereas trend is typified by lower suburban densities. Yet, while development density and pattern are related, the latter is viewed as being important in its own right in terms of affecting infrastructure costs. There is a development pattern–capital cost association for the following reasons:

1. *Need.* More efficient managed development will have less need for infrastructure because it will be able to direct more development to

pockets of remaining surplus capacity in already-existing capital facilities. This is especially true in areas the market has not rejected. These include schools, which can accommodate additional pupils, sewage plants with remaining treatment capacity, and so on. In contrast, trend development, by often locating away from existing locations, does not capitalize on the excess capacity of infrastructure already in place and, as a result, fosters the growth of additional infrastructure.

2. *Distance.* Even when planned development requires new capital improvements, these will be built over shorter distances than with a sprawled development pattern. With managed growth's more compact development emphasis, fewer miles of roadways, water and sewer lines, and so on, will have to be built, thereby offering savings. The converse results with trend.

3. *Efficiency.* With managed growth, bringing together larger numbers of people in more compact development forms, there is greater potential for economies of scale in the meeting of capital needs. A larger central sewage treatment plant can be built as opposed to smaller, individual package facilities; under the former, the capital cost per gallon is reduced. Managed growth might also lend itself to the construction of larger educational facilities (e.g., a 700-pupil versus a 500-pupil elementary school), where the cost per student could be much lower. Planned growth may offer the critical mass necessary for more efficient state or interstate road usage; if so, local roadway improvement costs can be reduced relative to the prevailing trend pattern, where the spread forms cause the need for more lane-miles of local roads.

There are several dimensions wherein capital costs can be saved with managed (planned/CCMP) versus trend (STATUS QUO) development. Several studies have concluded that these savings are possible. To illustrate, a 1975 Rand report funded by the National Science Foundation projected the off-site capital improvements (streets, utilities, fire protection, and so forth) for a community in California under three patterns: "compact," "scatteration," and "leapfrog"

(Dougharty 1975). The first is analogous to what has been referred to here as managed development; the remaining studies characterize two forms of trend development. The Rand study projected that whereas the capital outlay for the equivalent of managed development would be $2,000 per unit, with "scatteration" and "leapfrog," costs could exceed $10,000 per unit. The biggest difference was with respect to roads and utilities, where the more compact or planned development was much more efficient.

A large-scale study on a similar issue was conducted in 1989 in Florida, entitled *The Search for Efficient Growth Patterns* (Duncan et al. 1989). This analysis encompassed detailed case studies of the actual costs (and revenues) incurred by several completed residential and nonresidential projects throughout Florida. The projects were chosen as being representative of five different development patterns ranging from "scattered" to "compact." While the Florida study did not intend such an analysis, it is possible to group its five patterns into the two aggregate development profiles of "trend" (STATUS QUO) versus more "managed" or "planned" (CCMP) growth. The former includes the Florida development patterns of "scattered," "linear," and "satellite"; the latter includes the Florida "contiguous" and "compact" categories. With this grouping, the relative capital costs for trend versus managed or planned growth can be determined from the base Florida case study information on incurred infrastructure expenses. While the total capital expense for a detached unit built under trend in Florida approached $16,000, under a planned configuration the capital need was about $11,000, or roughly 70 percent of "trend" (Table III-1).

There have been other studies over a nearly forty-year period that have examined the interrelationship between land use and infrastructure costs. Notable examples include *The Cost of Municipal Services in Residential Areas* (Wheaton and Schussheim 1955), *Municipal Costs and Revenues Resulting from Growth* (Isard and Coughlin 1957), *The Costs of Sprawl* (Real Estate Research Corporation [RERC] 1974), the Windsor and Altshuler critiques of the RERC study (Windsor 1979; Altshuler 1977), and more recent analyses, such as *Development in Wright County, Minnesota* (Resource Management Consultants 1989). For example, the *Wright County* study showed that higher-density development close to existing urban infrastructure was less expensive to serve than lower-density development located farther from established public service centers.

TABLE III-1

James Duncan—Florida Growth Pattern Study: Capital Facility Costs under Trend versus Planned Development

(per dwelling unit; 1990 dollars)

Category of Capital Costs	Average of Case Studies under Trend Development [1]	Average of Case Studies under Planned Development [2]	Trend Versus Planned Development *Difference* # / %	
Roads	$ 7,014	$ 2,784	(+) $4,230	60.3
Schools	6,079	5,625	(+) 454	7.4
Utilities	2,187	1,320	(+) 867	39.6
Other	661	672	(–) 11	1.7
TOTAL	$15,941	$10,401	(+) $5,540	36.7

Notes:

1. Trend development as defined here includes the following patterns of "urban form" analyzed by the Florida study: "scattered," "linear," "and satellite." The capital cost figures shown in this table are averages of the Florida case studies characterized by the scattered, linear, and satellite patterns (e.g., Kendall Drive, Tampa Palms, University Boulevard, and Cantonment).
2. Planned development as defined here includes the following patterns of "urban form" analyzed by the Florida study: "contiguous" and "compact." The capital cost figures shown in this table are averages of the Florida case studies characterized by the contiguous and compact patterns (e.g., Countryside, Downtown Orlando, and Southpoint.)

Source: Memorandum from James Duncan and Associates to Robert W. Burchell and David Listokin, May 8, 1990; and James Duncan et al., *The Search for Efficient Urban Growth Patterns.* Report prepared for the Governor's Task Force on Urban Growth Patterns and the Florida Department of Community Affairs (Tallahassee, July 1989).

A study by James Frank for the Urban Land Institute in Washington, D.C., reviewed the national literature conducted over roughly a four-decade period (Frank 1989). Frank ordered the findings of the various reports and expressed them in equivalent dollar terms (1987 dollars). He concluded from the national literature that multiple factors affected development costs including density, contiguity of development, distance to central public facilities (i.e., sewage and water plants), as well as other characteristics such as municipal improvement standards. The dollar impacts of these different factors identified by Frank are summarized in Table III-2. In brief, capital costs are highest in situations of low density, sprawl, and for development located a considerable distance from central facilities. By contrast, costs can be dramatically reduced in situations of

TABLE III-2

James E. Frank—Urban Land Institute National Literature Synthesis: Capital Facility Costs of Development

(per dwelling unit; 1987 dollars)

Density and Dwelling Type	Service Category	Neighborhood Costs	Community Costs		Costs for Distance to Employment, Sewage Plant, Water Plant, Receiving Body of Water	
			Contiguous	*Leapfrog*	*5 Miles*	*10 Miles*
1 d.u./4 acres (SF)	Streets	24,848	-	-	2,500	5,000
	Utilities	39,951	-	-	4,800	9,600
	Schools	12,813	-	-	NA	NA
1 d.u./acre (SF)	Streets	12,308	-	-	2,500	5,000
	Utilities	19,789	-	-	4,800	9,600
	Schools	12,313	-	-	NA	NA
3 d.u./acre (SF Conventional)	Streets	7,083	-	1,891	2,500	5,000
	Utilities	11,388	-	2,406	4,800	9,600
	Schools	12,313	-	-	NA	NA
5 d.u./acre (SF Clustered)	Streets	6,121	1,405	-	2,500	2,500
	Utilities	7,574	1,279	-	4,800	9,600
	Schools	12,313	-	-	NA	NA
10 d.u./acre (Townhouses)	Streets	4,855	1,930	2,788	2,350	4,700
	Utilities	4,920	1,099	2,231	4,525	9,050
	Schools	10,438	-	-	NA	NA
15 d.u./acre (Garden Apartments)	Streets	3,367	1,930	2,788	2,350	4,700
	Utilities	3,285	1,099	2,231	4,525	9,050
	Schools	10,438	-	-	NA	NA
30 d.u./acre (High-rise Apartments)	Streets	1,843	1,930	2,788	2,000	4,000
	Utilities	1,997	1,099	2,231	3,840	7,680
	Schools	3,786	-	-	NA	NA
12 d.u./acre (Housing Unit Mix)	Streets	4,653	1,576	2,194	2,350	4,700
	Utilities	5,789	1,076	1,676	4,525	4,700
	Schools	9,860	-	-	NA	NA

Notes: du = dwelling unit
SF = single-family
NA = not applicable

Source: James E. Frank, *The Costs of Alternative Development Patterns.* Washington, D.C.: ULI, 1989.

higher-density development that is centrally and contiguously located. As described by Frank:

> When all capital costs are totaled . . . the total cost for low density . . . sprawl . . . is slightly more than $35,000 per dwelling unit. Further, if that development is located 10 miles from the sewage treatment plant, the central water source, the receiving body of water, and the major concentration of employment, almost $15,000 per dwelling unit is added to the cost, for a total of $48,000 per dwelling unit. . . .
>
> The cost can be reduced to less than $18,000 . . . by choosing a central location, using a mix of housing types in which single-family units constitute 30 percent of the total and apartments 70 percent, and by planning contiguous development instead of leapfrogging. (Frank 1989, 39)

To the extent that planned or CCMP growth fosters the more efficient patterns described above—centrally located, contiguous development that includes units at somewhat higher density—it can achieve infrastructure savings relative to trend (STATUS QUO) development.

As noted earlier, the Rutgers impact assessment considered the consequences to the state of New Jersey of planned (PLAN) versus traditional (TREND) development across numerous substantive dimensions. A summary of its major findings is contained in Table III-3. To illustrate, while a similar level of growth would occur in New Jersey under both scenarios (TREND and PLAN) from 1990 to 2010 (an increase of 520,000 persons, 431,000 households, and 654,000 jobs), there would be significant savings under PLAN with respect to infrastructure. Over the period 1990 to 2010, planned versus traditional development would require:

- $699 million less investment in roads ($2,924 million for TREND) versus $2,225 million for PLAN, or a 24-percent savings
- $561 million less investment in water and sewer (utility) costs ($7,424 million for TREND versus $6,863 million for PLAN), or a 7.6-percent savings
- $173 million less investment in schools ($5,296 million for TREND versus $5,123 million for PLAN), or a 3.3-percent savings

TABLE III-3

Robert W. Burchell—New Jersey Impact Assessment: Summary of Impacts for Trend versus Planned Development

Growth/Development Impacts [1]			Trend Development [1]	Planned Development [2]	Trend Versus Planned Development	
					Difference	*%*
I.	POPULATION GROWTH	(persons)	520,012	520,012	0	0
II.	HOUSEHOLD GROWTH	(households)	431,000	431,000	0	0
III.	EMPLOYMENT GROWTH	(employees)	653,600	653,600	0	0
IV.	INFRASTRUCTURE					
	A. ROADS	($ millions)[3]				
	State		$2,197	$1,630	$567	25.8
	Local		727	595	132	18.2
	Total Roads		$2,924	$2,225	$699	23.9
	B. UTILITIES—Water	($ millions)	$ 634	$ 550	$ 84	13.2
	C. UTILITIES—Sewer	($ millions)	$6,790	$6,313	$477	7.0
	Total Utilities		$7,424	$6,863	$561	7.6
	E. SCHOOLS	($ millions)	$5,296	$5,123	$173	3.3
	F. ALL INFRA-STRUCTURE (sum of A–E in $ millions)		$15,644	$14,211	$1,433	9.2
V.	LAND CONSUMPTION					
	A. Overall Land	(acres)	292,079	117,607	174,472	59.7
	B. Frail Lands	(acres)	36,482	6,139	30,343	83.2
	C. Agricultural Lands	(acres)	108,000	66,000	42,000	38.9
VI.	HOUSE PRICE					
	A. Median Cost per Unit	(1990 $)	$172,567	$162,162	$10,495	6.1
	B. Housing Index (higher is more affordable)		118	126	8	6.7

Notes:
1. For TREND, see text.
2. For PLAN, see text.
3. in millions of 1990 dollars

Source: Robert W. Burchell et al., "Impact Assessment of the New Jersey Interim State Development and Redevelopment Plan. Report III: Supplemental AIPLAN Assessment." April 30, 1992.

When all these components of infrastructure were summed (roads, utilities, and schools), the Rutgers impact assessment found that traditional development patterns (TREND) would necessitate a statewide infrastructure outlay of $15.6 billion from 1990 to 2010. By contrast, opting for a more planned approach (PLAN) would reduce the necessary capital investment over the two decades from $15.6 to $14.2 billion—representing a savings of $1.4 billion, or just under 10 percent (Table III-3).

In short, the Rutgers study reached a conclusion similar to earlier investigations with respect to infrastructure: planned development can realize savings with respect to the capital extensions necessitated by growth.

INFRASTRUCTURE COSTS AND TREND VERSUS PLANNED GROWTH

The previous section reviewed several studies that have examined the issue of infrastructure costs and planned development. Their findings are synthesized below.

While there have been many investigations on this topic, three major studies stand out: James Duncan and associates, The *Search for Efficient Urban Growth Patterns* (1989); the literature synthesis by James E. Frank (1989), *The Costs of Alternative Development Patterns: A Review of the Literature;* and the Rutgers University studies by Robert W. Burchell and others, *Impact Assessment of the New Jersey Interim State Development and Redevelopment Plan* (1992a) and *Impact Assessment of the New Jersey Interim State Development and Redevelopment Plan: Supplemental AIPLAN Assessment* (1992b). The synthesis of the infrastructure savings potential from planned development will be based on these three major investigations by Duncan, Frank, and Burchell.

It is further instructive in considering infrastructure to differentiate by the category of capital need. The major groups are streets, utilities (water and sewer), schools, and "other"—the last category including such capital outlays necessitated by growth as police, fire, and EMS stations.

In the Duncan study, planned development is 40 percent of the cost of trend development with respect to roads and is 93 percent, 60 percent, and 102 percent as expensive in terms of school, utility, and other capital outlays, respectively. The basis for these comparisons is detailed in Table III-1 and summarized in Table III-4.

TABLE III-4

Relative Infrastructure Costs of Trend versus Planned Development from Three Major Studies

Infrastructure Cost Category	Trend Development	Planned Development: Findings from Three Major Studies (in percent, relative to Trend)			Planned Development: Synthesis from Three Major Studies (in percent, relative to Trend) [4]
		Duncan Study [1]	*Frank Study* [2]	*Burchell Study* [3]	
Roads	100%	40%	73%	76%	75%
Schools	100%	93	99	97	95
Utilities	100%	60	66	92	85
Other	100%	102	NA [5]	NA	100%

Notes:
1. Derived directly from Table III-1.
2. This is calculated from the base Frank findings as follows:

Assumed Percentages [6]

Density and Dwelling Types	*Trend Development*	*Planned Development*
1 dwelling unit/4 acres	6.8%	6.2%
1 dwelling unit/acre	20.4	6.2
3 dwelling units/acre	34.0	37.2
5 dwelling units/acre (clustered)	6.8	12.4
	68.0	**62.0**
10 dwelling units/acre (townhouse)	20.0	22.0
15 dwelling units/acre (multifamily)	12.0	16.0
	100.0%	**100.0%**

The above percentages are applied as weights to the Frank findings by dwelling type (see Table III-2) to derive a weighted unit distribution. It is further assumed that development will be leapfrog and at a "10-mile distance") under Trend, and contiguous and at a "5-mile distance" under Planned development (see Table III-2).

3. Derived directly from Table III-3.
4. Represents a synthesis or consensus from the three studies noted above.
5. Not applicable.
6. Derived from the Burchell et al. New Jersey impact assessment study (1992a).

Source: Tables III-1, III-2, and III-3 and text.

In the Frank synthesis of the literature, the capital costs of multiple individual development patterns were investigated (i.e., infrastructure outlays of higher- versus lower-density single-family detached and attached homes) as opposed to the capital implications of the two polar groups of planned versus trend development. If Frank's multiple individual development types are aggregated into those more likely to be found under trend versus planned development (i.e., more leapfrog single-family detached and lower-density units in the former, and more contiguous, clustered single-family detached and higher-density units in the latter), the following findings can be extracted from this summary of the literature. Planned development is 73 percent of the cost of trend development with respect to roads, 99 percent of the cost of school capital expenditures, and 66 percent of the cost of utility capital extensions (Table III-4). Frank's study did not consider the "other" infrastructure category, as did Duncan's.

In the Burchell et al. impact assessment, since the focus of this analysis was a simultaneous comparison of the impacts of trend versus planned development, the capital infrastructure profile of these two scenarios is readily available. Planned development relative to trend development requires 76 percent of the capital costs for roads, 97 percent of the costs for schools, and 92 percent of the costs for utilities. (The "other" capital category was not examined.) The basis for these figures is detailed in Table III-3 and summarized in Table III-4.

In summary, three major studies over the past decade—Duncan, Frank, and Burchell—have examined in detail infrastructure demands under traditional or trend development versus a planned alternative. All conclude that economies are possible under a planned approach concerning road and utility extensions, while a more modest saving is afforded with respect to schools.

As would be expected, the exact findings from these three major studies differ somewhat. For instance, planned development allows for a 7-percent school infrastructure saving according to Duncan, while Frank and Burchell find 1 percent and 3 percent economies, respectively. The commonalities in the direction and order of magnitude of the findings are much stronger, however, than these individual differences and are shown as "synthesis findings" from the three major studies as follows. Relative to trend development, planned development is 75 percent of the infrastructure cost for roads; 95 percent of the infrastructure costs for schools; 85 percent of the infrastructure costs for utilities; and is at parity (100 percent) for the "other" capital category.

DEVELOPMENT PATTERNS AND HOUSING COSTS

Does the land preservation noted above and, more generally, the overlay of regulations inherent in managed growth, drive up the cost of housing? There are a number of studies that reveal that in the immediate area where there are restrictions, housing prices increase (Fischel 1990). For instance, Schwartz, Hansen, and Green (1981) followed the effects over time of the Petaluma (California) Plan. This plan severely limited building permits, favoring dwellings with costly design features and developer-provided amenities and services to the community. Using a statistical (i.e., hedonic) pricing technique, the authors compared the price of a standard bundle of housing characteristics to the corresponding price in nearby Santa Rosa, which had not adopted growth controls during the period. The authors found that after several years, Petaluma's housing prices had risen 8 percent above those of Santa Rosa.

Schwartz, Zorn, and Hansen (1989) did a similar study of the growth controls in Davis, California, comparing house prices in Davis to those in a control sample of other Sacramento suburbs. They found that growth controls caused house prices in Davis to be 9 percent higher in 1980 than they would have been without them.

In Petaluma (Schwartz, Hansen, and Green 1981) and in Davis (Zorn, Hansen, and Schwartz 1986), the effects on the housing stock affordable to low- and moderate-income households relative to control areas were also monitored. In Petaluma, the authors found that the percentage of the housing stock that was affordable to low- and moderate-income households had dropped significantly below that of a control group (Fischel 1990).

In Davis, on the other hand, growth controls required that those who received building permits construct some units earmarked for low-income people. Thus, the limited growth that did occur in Davis contained both low-income and high-income housing. According to Fischel (1990), however, an unanticipated offset to this apparent success occurred. The authors noted that existing housing in Davis increased not only in price but in quality. Fischel's interpretation of this outcome is that older housing was filtering up rather than down.

Katz and Rosen (1987) analyzed 1,600 sales transactions of single-family houses during 1979 in 64 communities in the San Francisco Bay Area. Of these transactions, 179 involved houses located in communities where a building permit moratorium or binding rationing system was recently or currently in

effect. According to Fischel (1990), this study is particularly valuable since, unlike the above California studies, it does not focus on just a single community. The authors found that the price of houses sold in the growth-controlled communities was higher than those sold in other communities.

HOUSING COSTS AND TREND VERSUS PLANNED GROWTH

The above studies deal with the price effects of growth controls in a given community. What about the overall housing affordability in a larger area governed by managed growth where development would be restricted in certain localities (i.e., areas with frail lands) while encouraged in others (areas with existing or excess infrastructure capacity, such as centers)? The only study to date that has considered housing affordability under managed growth on such a large-scale basis is the Rutgers University impact assessment. Here the impact team examined the statewide consequences of housing affordability again under traditional development (TREND) versus managed growth (PLAN). The analysis first examined impacts on land prices and from that determined the total housing price for different types of residential units under the two development scenarios. The findings were as follows:

1. Relative to traditional development (TREND), where growth was occurring in New Jersey's outlying locations and often encroaching on environmentally sensitive areas, managed or planned growth (PLAN) would limit growth in such areas or would allow development only at lower densities (i.e., to be environmentally compatible).

2. Given these land development curtailments under PLAN, the impact assessment found that the price per acre of land would drop in such locations—e.g., Planning Area (PA) 4—Rural Planning Area and Planning Area (PA) 5—Environmentally Sensitive Planning Area.

3. While the price per acre would decline, since the amount of land that a housing unit would occupy in such areas as PA4 or PA5 would increase under PLAN (as development would be allowed only at lower densities), overall housing prices would increase in such locations.

4. There would be a contrary effect, however, in other portions of the state under PLAN. For instance, under PLAN greater development would be taking place in what are referred to as "centers"—in contrast to the deconcentration occurring under TREND. The impact assessment found that housing prices would decrease in centers given their inherent higher density and the housing mix that was proposed there (e.g., a higher share of attached units).

5. The impact assessment projected instances where, relative to TREND, PLAN would be increasing housing costs—e.g., in the rural and environmentally sensitive locations—and cases where PLAN lowered housing costs. Since housing developed in centers would exceed in quantity the housing built in the environs, housing costs under PLAN would be somewhat less than under TREND.

6. The specific findings are noted in Table III–3 and are summarized as follows: Under TREND, the median housing price in constant 1990 dollars was $172,567; under PLAN, the price was $162,162—$10,495 less, representing a saving of just over 6 percent.

In short, when the overall picture is examined with respect to housing affordability under managed growth—taking into account both instances of rising and lowered costs, as was done in the New Jersey impact assessment—the finding is that managed growth moderates rather than increases the cost of housing.

DEVELOPMENT PATTERNS (TYPES OF LAND USES) AND FISCAL IMPACT

In analyzing the impacts of land uses, it is becoming accepted that, generally speaking, some types of land uses are better fiscally than others. Nonresidential land uses, for the most part, have been shown to be more profitable; most standard forms of residential land uses, less profitable (Table III-5). Further, within the residential and nonresidential sectors, there are varying degrees of profitability. Profitability means that some land uses produce more revenues than costs, i.e., if service levels were maintained at the same level after development, taxes could be decreased. On the other hand, the reverse is also

TABLE III-5

The Hierarchy of Land Uses and Fiscal Impacts

		RESEARCH OFFICE PARKS	
		OFFICE PARKS	
		INDUSTRIAL DEVELOPMENT	
		HIGH-RISE/GARDEN APARTMENTS *(STUDIO/1 BEDROOM)*	
		AGE-RESTRICTED HOUSING	
		GARDEN CONDOMINIUMS *(1–2 BEDROOMS)*	
MUNICIPAL BREAK-EVEN	(+)	OPEN SPACE	
	(–)	RETAIL FACILITIES	
		TOWNHOUSES *(2–3 BEDROOMS)*	
		EXPENSIVE SINGLE-FAMILY HOMES *(3–4 BEDROOMS)*	
			(+) SCHOOL DISTRICT BREAK-EVEN
		TOWNHOUSES *(3–4 BEDROOMS)*	(–)
		INEXPENSIVE SINGLE-FAMILY HOMES *(3–4 BEDROOMS)*	
		GARDEN APARTMENTS *(3+ BEDROOMS)*	
		MOBILE HOMES *(UNRESTRICTED AS TO OCCUPANCY LOCALLY)*	

Note: The above list contains too many disclaimers to include here. Suffice it to say that fiscal impacts always must be viewed relative to the context of other properties' impacts in the jurisdiction of development.

true. In some cases, costs exceed revenues and, all things being equal, taxes might have to be increased (Burchell and Listokin 1994).

The fiscal impact hierarchy can be viewed as extending from research office parks at the top to mobile homes at the bottom. Somewhere in the middle are found open space lands or undeveloped and unimproved property. The hierarchy takes both costs and revenues into account. It shows which land uses,

after all costs and revenues are considered, are more fiscally profitable than others. It also takes into account how many jurisdictions revenues are paid towards (municipal, school, district, and so on) and thus the absolute level of revenues paired against the array of costs (public safety, public works, education, and the like) that are generated by the various land uses.

Position on the fiscal impact hierarchy depends on type of unit (reflecting size or intensity of use) within both residential and nonresidential classifications. Fiscal position also depends on the service district in which it is being viewed. Often, for instance, a small condominium or age-restricted housing may be break-even or just positive or negative in the municipal service jurisdiction, yet both may be very positive fiscal ratables in the school district. On the other hand, larger townhouses may be just below break-even in the school district yet significantly negative in the municipal jurisdiction.

Development that has taken place before the one currently analyzed in a community also affects the future impacts of the latter. In communities where prior similar development is less expensive than what is being developed, there is a good chance that new development will cause positive fiscal impacts. In the reverse case, where prior similar development is more expensive than the product currently being developed, there is a good chance that new development will occasion negative impacts. In terms of municipal and school service districts, rarely, if ever, is a land-use entity positive municipally yet negative in the school district. The one exception might be moderately priced "gate communities" wherein most municipal-type services (road maintenance and repair, security, street lighting, street cleaning, garbage pickup, and local recreational services) are provided by the homes association and paid for by membership fees, yet some children of the community attend high-cost-per-pupil public schools and induce public educational costs.

FISCAL IMPACTS AND TREND VERSUS PLANNED GROWTH

Fiscal impacts and observed differences under trend versus planned growth are dependent upon two different influences from development patterns. The first is the ability to influence type of development by planned versus historical, or trend, growth. To the degree that dwelling type can be changed by planned development in sub-state settings, the demographics and, resultantly, the public service costs of development will change. The second is the ability of planned development to influence the intensity and compactness of new neigh-

borhoods. If planned development can provide more compact development patterns, infrastructure provision will be less. So too will the annual debt service on capital costs for roads, water/sewer lines, and so on, as well as the annual costs of maintenance associated with these facilities. Related to this is the location where development takes place. If located near existing development, excess service capacity may be drawn upon. If development is skipped over, public service infrastructure will almost always have to be provided at a cost more expensive than extending existing facilities.

The reality is that the latter category of influence is the one that, for areally larger applications of growth management (i.e., at the state level), is the only one that should be considered. In the case of the former, it is very difficult to influence housing demand by type for an entire state. At the sub-state level, for every ability to influence this choice, you are potentially exporting the reverse of this effect to another sub-state area. In other words, by saving public service costs due to different demographics of structures occupied, those who would have occupied the original structures of a different type may go elsewhere to reside.

In one of the only studies since the 1974 *Costs of Sprawl* study to view the effects of different development patterns on public service costs, the Rutgers University *Impact Assessment of the New Jersey State Development and Redevelopment Plan* found that future annual debt service costs, public service costs, and capital construction costs would each be reduced somewhat under PLAN versus TREND growth:

> The fiscal impact assessment compares public service costs with public revenues from accommodating new residents, workers, and public school children. By containing population and jobs in already developed areas and by creating or expanding Centers in newly developing areas, the State Plan offers an annual $112 million [or 2 percent] fiscal advantage to municipalities. This advantage reflects the ability under PLAN to draw on usable excess operating capacity in already developed areas as well as efficiencies of service delivery. For instance, fewer lane-miles of local roads will have to be built under PLAN, thus saving municipal public works maintenance and debt service costs. Public school districts will realize a $286 million [or 2 percent] annual financial advantage under the State Plan, again a reflection of drawing on usable excess public school operating capacity and other service and fiscal efficiencies realized due to the redirection of population under PLAN. Thus, municipal and school district providers of public services could be ahead fiscally by close to $400 million annually under PLAN compared to TREND, while supplying a similar quality of services.

Under TREND, the State's school districts will have to provide 288,000 pupil spaces to the year 2010 (365,000 gross need less 77,000 usable excess spaces); for PLAN, the need is a somewhat lower 278,000 pupil spaces. Overall, if new space had to be built to accommodate all new students, costs of new school facilities would be approximately $5.3 billion under TREND and $5.1 billion under PLAN. Thus, $200 million [or approximately 3 percent] is potentially saved due to somewhat more excess capacity in closer-in areas being drawn upon by PLAN as opposed to what is drawn upon by TREND in suburban and rural areas.

SUMMARY

This section has reviewed the literature with regard to planned growth versus more traditional, or trend, development for land consumption, infrastructure requirements/costs,[1] and housing costs. The most extensive literature concerns capital needs/costs, and there are sparser empirical investigations with respect to the remaining three subject areas. The findings are as follows:

- LAND CONSUMPTION

  Planned development relative to trend consumes:
  - 40 percent as much land overall
  - 60 percent the amount of agricultural acreage and 17 percent the level of development on frail lands

- INFRASTRUCTURE

  Planned development relative to trend is:
  - 75 percent as expensive with respect to roads
  - 95 percent as expensive with respect to schools
  - 85 percent as expensive with respect to utilities
  - at parity with respect to other infrastructure

- HOUSING COSTS

  Planned development relative to trend:
  - doesn't increase housing costs and, in fact, may afford a small (i.e., less than 6-percent) savings

- FISCAL IMPACT

  Planned development relative to trend:
  - is less costly on an annual basis to both municipality and school district by about 2 percent
  - requires less capital expenditure (about 3 percent) for school districts

[1] Three studies summarized; for other areas of impact, New Jersey State Development and Redevelopment Plan (AIPLAN) Impact Assessment is the primary source.

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Section IV

LAND CONSUMPTION, INFRASTRUCTURE REQUIREMENTS, HOUSING COSTS, AND FISCAL IMPACTS UNDER STATUS QUO AND CCMP GROWTH FOR ALL AND INDIVIDUAL STUDY COMMUNITIES IN THE DELAWARE ESTUARY

INTRODUCTION

This section of the report deals with the specific effects of growth under trend (STATUS QUO) conditions versus growth under planned (CCMP) conditions in the study communities of the Delaware Estuary. STATUS QUO conditions reflect development patterns occurring over the past several years. These have been reported to the study team by knowledgeable professionals in the area. CCMP conditions reflect certain desired goals of development as articulated in the Delaware Estuary Comprehensive Conservation Management Plan (Delaware Estuary Program 1995). This has been discussed in Section II and will be described in more detail shortly. This alternative involves more and somewhat higher-density growth around established areas in communities, and less growth and lower densities in peripheral rural areas. It also involves goals of agricultural and frail environmental land savings; buffering of streams and other riparian corridors; protection of open water and other natural habitats; promotion of infrastructure, fiscal, and housing cost reductions; redevelopment of cities and other declining areas; and land development that is undertaken in an overall more responsible way.

In the previous section, the literature of the field was discussed as it related to: (1) *land takings*; (2) *infrastructure requirements*; (3) *housing costs*; and (4) *fiscal impacts* under traditional, or planned, development. The findings indicated that differences could indeed be observed. For the most part, they favored managed or planned growth: planned growth required significantly less land and infrastructure and resulted in somewhat better overall housing costs and fiscal impacts.

In this section, the growth patterns of the Delaware Estuary under STATUS QUO development will be compared to those under CCMP-inspired development to determine whether these same types of findings emerge. The analysis draws on the format and modeling of the analysis of the *New Jersey State Development and Redevelopment Plan* to assess the effects of these two alternative development scenarios on twelve specific communities in the estuary (Burchell et al. 1992a).

The analysis begins with projections of population and employment undertaken by the Pennsylvania Department of Environmental Resources (PA DER), the New Jersey Department of Transportation (NJDOT), and the University of Delaware (U DEL), Center for Applied Demography and Research. These projections, augmented and extended by the Center for Urban Policy Research at

Rutgers University, are converted to the demand for structures and land by specific study community within the Delaware Estuary (see Section II for specific data source citations). The amount of land taken by a development scenario in each community is then used with derivative models of the *Impact Assessment of the New Jersey State Development and Redevelopment Plan* to determine infrastructure requirements for several classes of roads and for water and sewer demand. Land consumption (to the degree that it affects the land share of housing costs) is also used to determine the impact of the two alternative growth scenarios on future housing costs within the region. Finally, information from municipal and school district budgets, together with the household and employment projections described earlier, is used to determine the differing fiscal impacts of development in each jurisdiction. These are further modified by infrastructure provision reductions and economies of scale in providing public services, as will be described shortly. From these analyses, statements can be made about the effects of STATUS QUO versus CCMP growth on future land consumption, infrastructure requirements, housing costs, and fiscal impacts in the study communities of the Delaware Estuary.

THE ASSESSMENT MODEL: POPULATION, HOUSEHOLD, AND EMPLOYMENT PROJECTIONS

Population and employment projections are undertaken for the Delaware Estuary as a whole and for select study communities for the twenty-five–year period 1995 to 2020. The latter date encompasses the time period that various governmental agencies have used for their projections; the former date is an interpolation of data between 1990 and 2000 to provide a starting point with the most currency.

Because population projections usually overestimate growth (especially if not limited by a state control), an attempt was made to use projections from state sources that used these controls. Another criterion employed for the selection of population projections was that they evidence a consistent coverage of the areas subject to analysis in a state and be linked to employment projections also evidencing consistent coverage of areas analyzed in that state. Thus, population projections for New Jersey are from the New Jersey Department of Transportation (NJDOT) and are linked to NJDOT employment projections. Similarly, population projections for Pennsylvania are from the Pennsylvania Department of Environmental Resources (PA DER) and are linked to dampened employment

projections from the Delaware Valley Regional Planning Commission (DVRPC) to adjust for sources of information without state control. Population projections for Delaware from the Center for Applied Demography and Research at the University of Delaware (U DEL) are linked with employment projections from the same source. Occasionally, the linkage of population and employment projections from similar sources is not possible, and it is necessary to use multiple sources. For instance, for some outer communities of Pennsylvania in the estuary, the Bureau of Economic Analysis (for employment) and the Pennsylvania Department of Environmental Resources (PA DER) (for population) had to be used in an adjusted format without establishing a clear relationship between the two sources. This procedure is explained in Section I.

Household projections for the period 1995 to 2020 are determined by dividing population projections by estimates of household size. Household size is decreased proportionately by 7 percent over the projection period before it is divided into population projections at specific points. Household projections for the study communities reflect the detailed field information obtained on future housing types to be developed in these communities. The following household sizes (including school-age children) were divided into population projections to determine resulting households at a particular period:

Housing Type	Household Size	School-Age Children
Single-family detached	3.55	0.79
Single-family attached (townhouses and duplexes)	2.55	0.31
Multifamily (three or more units)	2.09	0.21

Source: U.S. Census, Public Use Microdata Sample (PUMS) for new, non-central city housing in New Jersey, Pennsylvania, and Delaware

Employment projections from the above sources at the municipal level were analyzed by type according to host county projections disaggregated by type. Data on employment growth by type were available at the county but not at the municipal level. Unique employment concentrations of specific municipalities were also taken into account as employment was projected by type.

Household and employment projections for the CCMP development alternative were adjusted to allow a redirection of population and employment into communities that were declining. Household growth and employment growth were taken from those communities that were growing rapidly. This reallocation took place throughout the estuary, affecting all 500 communities represented there. Approximately 10 percent of the population and employment growth from communities growing by more than 10 percent during the period 1990 to 2020 was allocated to the larger communities declining by more than 5 percent during the same period. (Small rural declining areas were not part of the reallocation.) Reallocation of population and employment was made on the basis of severity of decline. The slice of change represented by the study communities shows that this process caused 1,100 more housing units and 1.1 million square feet less nonresidential space to be developed in these communities under the CCMP development alternative. This result is purely a function of the *gains* in housing and nonresidential space by *declining* communities of the study communities versus the *losses* in households and nonresidential space incurred by rapidly *growing* study communities in the estuary. At the aggregate estuary level, household growth and employment growth are similar over the projection period; at the study community level, there is no such relationship.

THE ASSESSMENT MODEL: RESIDENTIAL AND NONRESIDENTIAL SPACE DEMANDS

Residential Structures by Type

Household projections for study communities for the periods 1995 to 2020 are divided by municipal-specific vacancy rates to obtain gross housing-unit projections by type for the above period. These estimates of units to be produced are allocated to "near existing development" or "peripheral rural areas" according to estimates provided by local professionals. (See the tables of Section II—"STATUS QUO Development, Part A," for each community.) As an example, it is reported that 30 percent of the development in Whitpain Township (PA) is taking place in areas near existing development south of the Pennsylvania Turnpike; 70 percent of the growth in this community is taking place in less-developed areas north of the Pennsylvania Turnpike. Under STATUS QUO development for the community, 30 percent of the projected growth in housing units from 1995 to 2020 would be allocated to the area south of the turnpike according to the distribution of housing types (reported by professionals) that is

occurring there. In this case, it would be predominantly single-family development on one-third-acre lots, with some townhouse construction at eight units to the acre. (See the tables of Section II—"STATUS QUO Development, Part B," for each community.) For the 70 percent of the units that would be developed in the less-developed areas north of the turnpike, the predominant type would be single-family development, also on one-third-acre lots. Estimates and projections of residential growth are determined for the years 1995 and 2020. The former is subtracted from the latter to derive 1995 to 2020 housing-unit change.

Nonresidential Structures

Employment growth is transferred to the demand for nonresidential structures by converting nine (plus government) SIC (Standard Industrial Classification) codes of employment to employment in four categories of structures. This is done according to the conversions listed below:

Employment Type	Structure Type
Agricultural Services	Warehouse (40%); Retail (60%)
Mining	Industrial (20%); No structure (80%)
Construction	Warehouse (60%); Office (40%)
Manufacturing	Industrial (100%)
Transportation/Communications/Utilities (TCU)	Industrial (70%); Office (30%)
Wholesale	Warehouse (100%)
Retail	Retail (100%)
Finance/Insurance/Real Estate (FIRE)	Office (100%)
Services	Retail (70%); Office (30%)
Government	Office (100%)

Conversion to structure type generates the aggregate number of employees to be housed in certain types of structures. Employees determine the size of the structure according to the following relationships (Burchell et al. 1994):

Structure Type	Space per Employee (square feet)	Average Nonresidential Building Size (square feet)
Office	333	25,000
Retail	400	10,000
Industrial	667	10,000
Warehouse	1,000	50,000

Nonresidential structures are assumed to be developed as specification-constructed buildings of the size indicated above. Recognizing the high vacancy rates associated with nonresidential structures, to obtain the actual space of structures required to accommodate particular growth of employees, the employee-determined building size is divided by the following occupancy characteristics:

Office	Retail	Industrial	Warehouse
0.80	0.90	0.70	0.70

THE ASSESSMENT MODEL: LAND REQUIRED FOR RESIDENTIAL AND NONRESIDENTIAL PURPOSES

Residential

In order to convert residential structures to the demand for raw land, *densities* and *platting coefficients* are used. *Density* is the number of units that can be developed on an acre of land. One hundred acres developed at a density of five units to the acre allows for 500 single-family homes. This would provide each homeowner with a building lot of approximately 7,500 square feet.[1] Information on historical development densities by types of units developed both near existing development and in peripheral rural areas was obtained from knowledgeable professionals in each community. These are found in the tables of

1 This does not include land taken for platting needs; see above.

Section II of this study for each community under "STATUS QUO Development—Part C."

To this must be added an amount of land for roads, street hardware, utilities, and open space. This extra amount of land, which also includes inefficiencies in dividing up lots, the extra space of cul-de-sacs, and other rights-of-way requirements, is encompassed in a *platting coefficient* that usually varies from a low of 10 percent for multifamily units to a high of 20 percent for single-family units. Platting coefficients by housing type are as follows:

Single-family Detached	Single-family Attached/Duplex	Multifamily (5+ units)
0.20	0.15	0.10

Nonresidential

Structures are converted to land demands using a *floor–area ratio.* A *floor–area ratio* is the relationship between the amount of floor space in a building and the aggregate area of a developed land parcel. A 10,000-square-foot building on a one-acre lot (43,260 ft.^{2}) has a floor–area ratio of approximately 0.23. Floor–area ratios for the Delaware Estuary have been obtained from regional commercial developers and from Urban Design Architects (UDA) in Pittsburgh, Pennsylvania. UDA has completed residential and nonresidential development design recommendations for planned or "vision" growth in the Lexington, Kentucky Metropolitan Area (see UDA 1994).

Once the building size is known, it can be divided by the approximate floor–area ratio to determine the aggregate lot size per structure. Again, a platting coefficient is used to account for road and utility land consumption, inefficiencies in land design, required public open space, and so on, to allow this potential nonresidential parcel to become a developed office, retail, or industrial use. These platting coefficients are as follows:

Office	Retail	Industrial	Warehouse
0.20	0.05	0.15	0.10

RESULTS OF THE ASSESSMENT: RESIDENTIAL AND NONRESIDENTIAL SPACE CONSTRUCTED

Residential and Unit and Job Growth—Assumptions Under CCMP

The procedure outlined previously converts household growth to residential structures, and employment growth to nonresidential structures. As indicated previously, a reallocation procedure is used to redirect a portion of housing unit and job growth to declining areas under the CCMP growth alternative. Although this procedure follows the general description provided earlier, it differs somewhat for each state.

Residential Unit Growth

In New Jersey and Delaware, residentially declining communities over the period 1995 to 2020 were returned to neutral or zero growth rather than decline during the period. This was true for all communities except those of less than 3,000 population, wherein residential-unit growth was left unaltered.

In Pennsylvania, all residential decreases in excess of 3.1 percent were reduced to 3.1 percent, except for communities of less than 3,000 population size, in which case residential growth was left unaltered. These communities could not be returned to zero growth without endangering the positive growth of other communities in Pennsylvania in the estuary.

Ten percent (10%) of all residential-unit increases for communities projected to grow in excess of 10 percent over the period 1995 to 2020 was used to supply the locations of residential-unit decreases.

Employment Growth

In New Jersey, all Delaware Estuary communities of greater than 3.3 percent employment loss over the period 1995-2020 were reduced to 3.3 percent loss except for communities whose employment was 1,000 or less, which were

left unaltered. Again, insufficient employment growth precluded reducing these communities to zero employment growth.

The pool to augment employment-loss communities came from taking 10 percent of the employment increase of communities that were projected to increase by more than 10 percent over the period 1995 to 2020.

STATUS QUO versus CCMP Development

Residential Units and Nonresidential Space Constructed (Table IV-1)

STATUS QUO development in the twelve study communities produces about 46,500 development units (26,600 residential; 19,900 nonresidential) within the study communities over a 25-year period.[2] CCMP development produces about the same number of *overall* development units. STATUS QUO produces about 1,100 more nonresidential development units (1.1 million more nonresidential square feet of development). CCMP produces about 1,100 more residential units. CCMP has more housing-unit growth, primarily because of those units reallocated to Chester (1,150) from decreases in other growth communities in the estuary, including some minor decreases in the study communities. CCMP has less nonresidential development-unit growth than STATUS QUO because jobs taken to limit employment decline in Chester, Bridgeton, and other locations in the estuary required more to be taken from growing communities in the study group than were actually gained by declining communities in the study group. (Other declining communities outside the study group but inside the estuary also gained employment.)

A clearly significant difference between STATUS QUO and CCMP development in this portion of the analysis is that under STATUS QUO, 60 percent of development takes place in peripheral rural areas and 40 percent in close-in, existing areas. Under CCMP these figures are reversed: 60 percent takes place close-in and only 40 percent takes place in peripheral rural areas. In STATUS QUO, 19,500 residential units and 6.8 million square feet of nonresidential construction takes place outside existing development areas; 7,100 residential units and 13.1 million square feet of nonresidential space development takes place near existing development.

Under CCMP, 12,350 residential units and 3.9 million square feet of nonresidential space development takes place outside existing development

2 A development unit consists of either a residential unit or 1,000 ft.^{2} of nonresidential space.

TABLE IV—1
Residential Units (#) and Nonresidential Square Feet (000s)
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Total Development Units (#)

Residential (#) and Nonresidential (000s of sq.ft.)

	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
Municipality	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	918	325	1,243	1,120	273	1,393	(202)	52	(150)
Chesterfield	3,252	599	3,851	3,120	417	3,538	131	182	314
Commercial	439	307	746	613	174	786	(173)	133	(40)
Pennsauken	3,645	4,403	8,048	4,853	2,633	7,487	(1,209)	1,770	561
West Deptford	236	3,207	3,443	898	2,426	3,325	(662)	781	119
Pennsylvania									
Bensalem	6,297	980	7,277	6,746	243	6,989	(449)	736	287
Chester	(1,691)	(187)	(1,878)	(713)	(0)	(713)	(978)	(187)	(1,165)
East Coventry	113	164	277	155	104	260	(42)	59	17
Whitpain	1,291	1,792	3,083	1,813	1,082	2,895	(522)	709	188
Delaware									
Central Pencader	2,346	8,781	11,127	5,719	5,525	11,244	(3,373)	3,256	(117)
New Castle	2,920	4,681	7,602	5,037	2,626	7,664	(2,117)	2,055	(62)
Smyrna	468	1,170	1,639	849	758	1,607	(381)	413	32
12 Towns	20,235	26,223	46,458	30,211	16,263	46,474	(9,976)	9,960	(16)

Residential Units (#)

	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
Municipality	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	217	325	542	273	273	547	(57)	52	(5)
Chesterfield	257	599	856	417	417	834	(160)	182	22
Commercial	439	293	732	596	149	745	(157)	144	(13)
Pennsauken	993	425	1,418	1,229	217	1,446	(236)	209	(28)
West Deptford	236	2,123	2,359	700	1,634	2,334	(464)	489	25
Pennsylvania									
Bensalem	2,015	504	2,519	2,190	243	2,434	(175)	260	85
Chester	(1,675)	(186)	(1,861)	(713)	(0)	(713)	(962)	(186)	(1,148)
East Coventry	41	164	205	85	104	190	(44)	59	15
Whitpain	705	1,645	2,350	1,082	1,082	2,164	(377)	563	186
Delaware									
Central Pencader	2,145	8,580	10,725	5,428	5,428	10,856	(3,283)	3,152	(130)
New Castle	1,334	4,001	5,335	3,281	2,187	5,468	(1,947)	1,814	(133)
Smyrna	421	983	1,405	757	619	1,376	(336)	364	28
12 Towns	7,128	19,457	26,586	15,326	12,355	27,681	(8,198)	7,103	(1,095)

TABLE IV—1 (continued)
Residential Units (#) and Nonresidential Square Feet (000s)
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Nonresidential Square Feet (000s)

Municipality	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	701	-	701	846	-	846	(145)	-	(145)
Chesterfield	2,995	-	2,995	2,703	-	2,703	292	-	292
Commercial	-	14	14	16	25	41	(16)	(11)	(27)
Pennsauken	2,652	3,978	6,630	3,625	2,416	6,041	(972)	1,562	589
West Deptford	-	1,084	1,084	198	793	991	(198)	292	94
Pennsylvania									
Bensalem	4,282	476	4,758	4,556	-	4,556	(274)	476	202
Chester	(16)	(1)	(17)	-	-	-	(16)	(1)	(17)
East Coventry	72	-	72	70	-	70	3	-	3
Whitpain	586	147	733	731	-	731	(145)	147	2
Delaware									
Central Pencader	201	201	402	291	97	388	(90)	104	13
New Castle	1,587	680	2,267	1,757	439	2,196	(170)	241	71
Smyrna	47	187	234	92	138	231	(45)	49	3
12 Towns	13,107	6,766	19,872	14,885	3,908	18,793	(1,778)	2,858	1,079

Source: As per model and calculations in text.

areas; 15,300 residential units and 14.9 million square feet of nonresidential space construction occurs near existing development.

	Outside Existing Development	Near Existing Development
STATUS QUO	19,500 units; 6.8 million ft.^{2}	7,100 units; 13.1 million ft.^{2}
CCMP	12,350 units; 3.9 million ft.^{2}	15,300 units; 14.9 million ft.^{2}

RESULTS OF THE ASSESSMENT: LAND CONSUMPTION

Land Consumption Calculations

A land-capacity computer model is available that will convert all of the previous information on location and type of structure, density/floor area of development, and platting coefficients to the demand for residential and nonresidential developable land in a region. This model is fed by two individual development futures (STATUS QUO and CCMP) specific to each community and is controlled by development standards related to each of these futures. As indicated previously, development standards (density, type of development, and so on) for STATUS QUO come from historical development trends usually observed during the past five years. Development standards for CCMP reflect an alteration of STATUS QUO development, usually to include less of a share of overall development in the peripheral rural areas, and higher and lower densities in the closer-in peripheral rural areas, respectively. It also includes a larger share of clustering in the peripheral rural areas under CCMP development than is the case for STATUS QUO development.

Under CCMP development, there is an attempt to retain in close proximity to existing development one-third to one-half the growth that would traditionally skip over areas adjacent to this development. In other words, in Whitpain Township (PA), if STATUS QUO development retains 30 percent of future development close to existing development (south of the Pennsylvania Turnpike), the goal under CCMP development is to retain as much as 50 percent. Similarly, if Chesterfield Township (NJ) STATUS QUO development retains 30 percent of growth near existing development (in the vicinity of Crosswicks Village), the goal under CCMP development, again, is to retain as much as 50 percent.

Under CCMP development, there is also a goal to increase densities and floor–area ratios close to existing development by approximately 30 percent and 10 percent, respectively. These levels of increase in residential and nonresidential development density usually go unnoticed with good development design. Thus, in Whitpain Township (PA), if STATUS QUO development currently observes a density of 3.0 units to the acre for single-family development and a .20 floor–area ratio for office space close-in, the goal under CCMP development is to increase single-family development density to 3.9 units per acre and office space floor–area ratio to 0.22 for areas near existing development.

In peripheral rural areas, the goal of CCMP development is to decrease the overall density of residential development that takes place there. Thus, if in Chesterfield Township (NJ) development in rural areas is at 1 unit per 3 acres, the goal of CCMP development in peripheral rural areas is to decrease the density of this development to at least 1 unit per 5 acres.

In the peripheral rural areas, it is assumed that at least 20 percent of the single-family units developed there undergo some type of clustering. For comparison purposes, under CCMP development, the amount of land consumed over STATUS QUO development per developed parcel is not counted as land lost to development. (The full development acreage per parcel is taken in the housing-cost calculations.) Finally, in peripheral areas, 5 percent of all land consumed is reserved for buffers along riparian corridors and areas of natural habitat.

STATUS QUO versus CCMP Development

Gross Acres Taken (Table IV-2A)

STATUS QUO development for a twenty-five-year future consumes 15,955 acres of land for development in the Delaware Estuary study communities. Of this amount, nearly 12,735 acres, or nearly 80 percent, is to accommodate residential development. The remaining 3,220 acres answers the needs of employment growth of the nonresidential types discussed in Section II.

Of the land taken for residential and nonresidential purposes in the study communities, about 40 percent occurs each in New Jersey and Delaware communities; the remaining 20 percent is consumed by Pennsylvania communities. Within these states, significant amounts of land are consumed in Central Pencader (DE) and New Castle Division (DE), Pennsauken Township (NJ), and Bensalem Township (PA).

TABLE IV–2A
Developed Land Required as a Result of STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

All Developed Land (Acres)

	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
Municipality	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	109	86	194	119	72	191	(10)	14	4
Chesterfield	1,087	2,103	3,190	974	1,464	2,438	113	639	752
Commercial	159	311	471	160	162	322	(1)	149	148
Pennsauken	479	921	1,400	547	551	1,098	(69)	370	301
West Deptford	69	1,313	1,382	171	1,003	1,174	(102)	310	208
Pennsylvania									
Bensalem	1,343	355	1,698	1,153	128	1,281	190	227	417
Chester	(115)	(28)	(143)	(31)	(0)	(31)	(84)	(28)	(112)
East Coventry	87	345	432	126	220	346	(39)	125	86
Whitpain	347	614	961	382	380	762	(35)	234	199
Delaware									
Central Pencader	512	3,046	3,557	946	1,921	2,868	(435)	1,124	689
New Castle	462	1,139	1,601	712	631	1,343	(250)	508	257
Smyrna	177	1,037	1,214	245	653	898	(68)	384	315
12 Towns	4,714	11,240	15,954	5,504	7,185	12,689	(790)	4,055	3,265

Residential Land (Acres)

	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
Municipality	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	24	86	109	25	72	97	(1)	14	12
Chesterfield	535	2,103	2,638	521	1,464	1,985	14	639	653
Commercial	159	308	468	158	157	315	1	151	153
Pennsauken	151	45	196	140	19	159	11	26	37
West Deptford	69	1,117	1,187	147	860	1,007	(78)	258	179
Pennsylvania									
Bensalem	715	265	980	545	128	674	169	137	306
Chester	(113)	(28)	(141)	(31)	(0)	(31)	(82)	(28)	(110)
East Coventry	68	345	413	109	220	329	(41)	125	84
Whitpain	246	577	823	268	380	648	(22)	198	175
Delaware									
Central Pencader	486	3,011	3,497	913	1,905	2,817	(427)	1,106	679
New Castle	302	1,053	1,355	552	576	1,127	(249)	477	228
Smyrna	176	1,035	1,211	243	652	895	(67)	383	316
12 Towns	2,819	9,917	12,735	3,592	6,431	10,023	(773)	3,486	2,712

TABLE IV—2A (continued)
Developed Land Required as a Result of
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Nonresidential Land (Acres)

Municipality	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	85	-	85	93	-	93	(8)	-	(8)
Chesterfield	551	-	551	452	-	452	99	-	99
Commercial	-	3	3	2	5	7	(2)	(2)	(4)
Pennsauken	327	876	1,204	407	532	939	(79)	344	265
West Deptford	-	195	195	24	143	167	(24)	53	29
Pennsylvania									
Bensalem	628	90	718	607	-	607	21	90	110
Chester	(2)	(0)	(2)	-	-	-	(2)	(0)	(2)
East Coventry	19	-	19	17	-	17	2	-	2
Whitpain	101	37	137	114	-	114	(13)	37	23
Delaware									
Central Pencader	26	35	60	34	17	51	(8)	18	10
New Castle	160	86	245	161	55	216	(1)	30	29
Smyrna	1	2	3	2	1	4	(1)	0	(1)
12 Towns	1,896	1,323	3,219	1,913	754	2,666	(17)	570	553

Source: As per model and calculations in text.

Under CCMP development, with the increased densities in the areas to be developed around existing development, reflecting either slight movements to different housing types or to some increases in development density, there is a saving of more than 3,265 acres compared to STATUS QUO development. Even considering that there are larger lots per developed residential unit under the CCMP alternative in the peripheral rural areas, the overall land saving is more than 20 percent for this alternative. More compact development in the vicinity of existing development, and select and more limited development in rural areas, can save significant amounts of undeveloped land.

Two observations for both STATUS QUO and CCMP development in terms of land consumption are clear. First, a significant amount of land taking will occur over the next two and one-half decades under either scenario in these twelve communities. Second, for the twelve-community area as a whole, if CCMP development is not pursued, land outside existing development areas will be taken at a ratio of almost 3 to 1. Thus, of the 15,950 acres taken to accommodate residential and nonresidential development under STATUS QUO conditions, more than 70 percent (11,240 acres) would be consumed in peripheral rural areas. Dominant in this pattern are West Deptford Township (NJ), East Coventry Township (PA), and Central Pencader and Smyrna Divisions (DE), wherein large amounts of development are taking place outside existing development areas at subdivision-like densities.

On the other hand, if CCMP development is followed, land taken outside existing development areas will be in excess of 4,050[3] acres less than would be the case under STATUS QUO. Of the overall land saved by CCMP development, all would be outside the close-in development areas.

Agricultural Land Taken (Table IV-2B)

Agricultural land takings reflect the degree to which prime agricultural land and developable land are coterminous. Prime agricultural land[4] is less coterminous in locations of existing development; it is more coterminous in rural, undeveloped areas. Of the 15,950 acres in the study communities of the estuary taken for land development under the STATUS QUO scenario, about 51.5 percent, or 8,200 acres, is lost prime agricultural land. The reason that this number is *lower* than what is seen in most other analyses nationally of lost

3 More land is taken near existing development by CCMP than by STATUS QUO.
4 Reflects land of "superior soil, topography, and drainage of the region" (Schultz and Kasen 1984).

TABLE IV—2B
Agricultural and Frail Land Consumed
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Agricultural Land (Acres)

Municipality	STATUS QUO: Near Existing Development	STATUS QUO: Less Developed Peripheral Areas	STATUS QUO: Total	CCMP: Near Existing Development	CCMP: Less Developed Peripheral Areas	CCMP: Total	Difference (STATUS QUO minus CCMP): Near Existing Development	Difference (STATUS QUO minus CCMP): Less Developed Peripheral Areas	Difference (STATUS QUO minus CCMP): Total
New Jersey									
Bridgeton	-	9	9	-	7	7	-	1	1
Chesterfield	652	1,893	2,545	584	1,317	1,902	68	575	643
Commercial	24	280	304	24	146	170	(0)	134	134
Pennsauken	-	-	-	-	-	-	-	-	-
West Deptford	3	656	660	9	501	510	(5)	155	150
Pennsylvania									
Bensalem	67	18	85	58	6	64	9	11	21
Chester	-	-	-	-	-	-	-	-	-
East Coventry	17	207	224	25	132	157	(8)	75	67
Whitpain	104	368	472	115	228	343	(11)	141	130
Delaware									
Central Pencader	154	2,132	2,285	284	1,345	1,629	(130)	787	656
New Castle	46	569	615	71	315	387	(25)	254	229
Smyrna	71	933	1,004	98	588	686	(27)	345	318
12 Towns	1,138	7,065	8,203	1,268	4,586	5,854	(129)	2,479	2,350

Frail Land (Acres)

Municipality	STATUS QUO: Near Existing Development	STATUS QUO: Less Developed Peripheral Areas	STATUS QUO: Total	CCMP: Near Existing Development	CCMP: Less Developed Peripheral Areas	CCMP: Total	Difference (STATUS QUO minus CCMP): Near Existing Development	Difference (STATUS QUO minus CCMP): Less Developed Peripheral Areas	Difference (STATUS QUO minus CCMP): Total
New Jersey									
Bridgeton	5	9	14	6	7	13	(0)	1	1
Chesterfield	109	421	529	97	293	390	11	128	139
Commercial	48	156	203	48	81	129	(0)	75	74
Pennsauken	24	92	116	27	55	82	(3)	37	34
West Deptford	7	328	335	17	251	268	(10)	78	67
Pennsylvania									
Bensalem	67	18	85	58	6	64	9	11	21
Chester	(12)	(3)	(14)	(3)	(0)	(3)	(8)	(3)	(11)
East Coventry	9	103	112	13	66	79	(4)	37	34
Whitpain	17	61	79	19	38	57	(2)	23	22
Delaware									
Central Pencader	154	1,827	1,981	284	1,153	1,437	(130)	674	544
New Castle	46	342	388	71	189	260	(25)	152	127
Smyrna	35	104	139	49	65	114	(14)	38	25
12 Towns	509	3,457	3,967	686	2,205	2,891	(177)	1,253	1,076

Source: As per model and calculations in text.

agricultural land is that the Delaware Estuary area, outside the developed portion of major cities, is no longer dependent on agriculture (Coughlin and Keene 1981 *[National Agricultural Lands Study]*). Even here, however, when land is consumed, it is taken almost at a 1:2 ratio from prime agricultural land supplies. Near existing development, 25 percent of the land consumed for development also has had a direct prior agricultural use of reasonable quality. More than 85 percent of all lost agricultural land will occur outside existing development areas; nearly 57 percent of the land lost in these rural areas will be lost nearly equally in two locations: Chesterfield Township (NJ) and Central Pencader Division (DE). This relates to the growth taking place in these two municipalities, the amount of growth in peripheral rural areas in these locations, and the resultant densities at which growth is taking place.

Agricultural land taken under *CCMP* development is 5,850 acres versus over 8,200 acres lost via STATUS QUO development. Nearly thirty percent less prime agricultural land would be taken under a managed approach to growth than would be the case for traditional development in these study communities. Again, this relates directly to the overall amount of land consumed under each development scenario.

Frail Lands Taken (Table IV-2B)

Frail lands—lands that are particularly environmentally sensitive both to nature and to man—do not lend themselves well to development (Dahl 1990). The primary categories of frail lands that are water-based are floodplains, wetlands, and critical sensitive watersheds; those that are geologically based are steep slopes, sinkholes, and erosion-prone lands (Burchell et al. 1992a). Frail lands are more prevalent per acre of development in rural areas because these lands are, for the most part, undisturbed. Rough estimates of frail lands per acre of development taken have been obtained from planning and development professionals in the respective study communities.

For *STATUS QUO* development, given the quantity of land taken for development, there could be a loss of nearly 4,000 acres of environmentally sensitive land, half of which would occur in Central Pencader Division (DE).

For *CCMP* development, frail land lost is 73 percent of the STATUS QUO figure (2,890 acres), with a relatively similar share coming from Central Pencader. Because less land is consumed overall under CCMP guidelines, development can be more selective about taking frail lands.

RESULTS OF THE ASSESSMENT: ROAD INFRASTRUCTURE REQUIREMENTS AND COSTS

Infrastructure is the publicly owned and maintained land, hardware, or structures through, from, or on which public services emerge (Creighton 1970). The infrastructure analysis involves development's demand for roads (local and state) and water-based (water and sewer) utilities. It draws heavily on model results from trend versus plan evaluations in the *Impact Assessment of the New Jersey State Development and Redevelopment Plan* (Burchell et al. 1992b).

The demand for additional lane-mile capacity on local and state roads is related to the distribution and density of population across space (Stopher and Mayberg 1975). The model used is the one from the *Impact Assessment of the New Jersey State Development and Redevelopment Plan* (Burchell et al. 1992b), which relates road density to population density: an 86-percent correlation was found between 1985 estimated population density in municipalities and 1987 New Jersey Department of Transportation *local* road mileage in those same areas. The correlation between population density and *state* road mileage (center-line mileage) was 0.77. The model, based on density, projects state and local (municipal and county) road-miles at the municipal level.

Local and State Roads: Lane-Miles Required

Drawing on the *Impact Assessment of the New Jersey State Development and Redevelopment Plan* (Burchell et al. 1992b), it was found that for the Delaware Estuary existing development and peripheral rural area locations, local and state lane-miles per acre of land developed were as follows:

Local Lane-Miles per Acre

Location Type	Trend	Plan
Existing Development	.0216480	.0257056
Peripheral Rural Areas	.0167742	.0213053

State Lane-Miles per Acre

Location Type	Trend	Plan
Existing Development	.0005592	.0007789
Peripheral Rural Areas	.0005760	.0008541

These were observed in a situation where land taken in urban areas under planned development was 64 percent of that taken under trend, and land taken in rural areas under plan was 52 percent of that taken under trend. Regression analysis was used to relate ratios of land takings under CCMP and STATUS QUO development in the individual Delaware Estuary study communities in either close-in (near existing development) or outside (peripheral rural areas) development locations to what was observed for New Jersey. Where land takings as a share of STATUS QUO under CCMP development (Delaware Estuary) were not as pronounced as land takings as a share of trend under planned development (State of New Jersey), a linear regression adjusted the local (county or municipal) lane-miles required per developed acre under plan closer to the trend number; where they were more pronounced, they accentuated the differences noted above by increasing the plan lane-miles per acre.

This created for each Delaware Estuary community a unique local and state road lane-mile requirement per developed acre under CCMP development. Using these figures together with the land taken for development in each location, a requirement for lane-miles of local roads (2-lane roads) and state roads (4-lane, median-divided roads) was developed for both STATUS QUO and CCMP scenarios.

Local and State Roads: Costs

Costs for a 2-lane local (county or municipal) road were estimated at $750,000 per lane-mile for urban locations and $600,000 for rural locations in New Jersey; costs for a 4-lane, median-divided state road (extension or widening) were estimated at $1.25 million per lane mile in New Jersey urban locations and $900,000 per lane-mile in rural locations. The difference between urban and rural lane-mile costs involves primarily rights-of-way acquisitions that are higher in urban areas. The above costs were used for New Jersey study group municipalities; 85 percent of these costs was used for Pennsylvania study group municipalities; and 70 percent for Delaware study group municipalities.

STATUS QUO versus CCMP Development

Local Lane-Miles Required (Table IV-3)

The results of the *Impact Assessment of the New Jersey State Development and Redevelopment Plan* (Burchell et al. 1992b) were used as a key input to the assessment of local lane-mile requirements in the Delaware Estuary. Lane-miles relate to density, and both growth-management experiments vary density to accommodate the same levels of population and employment under trend growth as that under planned growth region-wide.

To accommodate a growth in residential units of 26,600 from 1995 to 2020, and a corresponding growth of 19.9 million square feet of employment space in the study communities of the Delaware Estuary, a total of 293.6 lane-miles will be required under *STATUS QUO* development. This is comprised of nearly a 1:2 ratio of lane-miles (105 versus 189) near, versus peripheral to, existing development. This should be viewed within the context that housing is built near existing development at a rate of 1 to 2.5 versus what occurs peripherally; further, nearly two-thirds of new employment-space growth is found near existing development. Thus, there is a relationship between density and lane-miles required. The relationship clearly recognizes that local roads are required in close-in areas even when development occurs at high densities there.

CCMP development requires nearly 57.2 lane-miles *less* of local roads than STATUS QUO development (236.4 lane-miles)—98 percent of the saving (56 lane-miles) occurring in peripheral rural areas. CCMP development can also build fewer lane-miles of local roads near existing development while additionally accommodating 8,200 more dwelling units in these locations. Since lane-miles rather than road-miles are used, these calculations already account for increased road requirements for higher-density development close to existing development.

Costs of Local Lane-Miles (Table IV-3)

Under *STATUS QUO* development, to provide for the construction of local roads to accommodate regional population growth of the next two and one-half decades, $164.1 million would be required. Under *CCMP* development, the figure is reduced to $135.3 million. Overall, there is a saving of $28.9 million, or 18 percent, in local road costs due to the more compact development patterns of CCMP development. In the Delaware Estuary, since developers pay for some share of two-lane local roads, this saving would be shared by the home-buying as

TABLE IV—3
Local Road Infrastructure Required (Lane Miles)
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Local Roads (Lane Miles)

	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
Municipality	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	2.4	1.4	3.8	2.4	1.2	3.7	-0.1	0.2	0.1
Chesterfield	23.5	35.3	58.8	22.1	25.7	47.8	1.4	9.6	11.0
Commercial	3.4	5.2	8.7	3.5	2.8	6.3	-0.1	2.4	2.3
Pennsauken	10.4	15.4	25.8	10.8	11.3	22.2	-0.5	4.1	3.6
West Deptford	1.5	22.0	23.5	2.1	18.0	20.1	-0.6	4.0	3.4
Pennsylvania									
Bensalem	29.1	6.0	35.0	26.6	2.7	29.4	2.4	3.2	5.7
Chester	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
East Coventry	1.9	5.8	7.7	2.0	4.0	6.0	-0.1	1.8	1.6
Whitpain	7.5	10.3	17.8	7.8	6.9	14.7	-0.3	3.4	3.1
Delaware									
Central Pencader	11.1	51.1	62.2	11.3	35.4	46.8	-0.3	15.6	15.4
New Castle	10.0	19.1	29.1	10.3	12.1	22.4	-0.3	7.0	6.7
Smyrna	3.8	17.4	21.2	4.2	12.8	17.1	-0.4	4.6	4.2
12 Towns	104.5	189.0	293.6	103.4	133.0	236.4	1.2	56.0	57.2

Local Road Costs (000$)

	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
Municipality	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	1,767	861	2,628	1,835	726	2,561	(68)	135	67
Chesterfield	17,641	21,166	38,807	16,611	15,396	32,008	1,030	5,770	6,800
Commercial	2,584	3,134	5,718	2,627	1,704	4,331	(42)	1,430	1,388
Pennsauken	7,772	9,268	17,040	8,136	6,805	14,942	(364)	2,463	2,099
West Deptford	1,122	13,213	14,335	1,568	10,787	12,355	(446)	2,426	1,980
Pennsylvania									
Bensalem	18,528	3,038	21,566	16,978	1,389	18,368	1,550	1,648	3,198
Chester	-	-	-	-	-	-	-	-	-
East Coventry	1,202	2,948	4,150	1,278	2,046	3,324	(76)	902	826
Whitpain	4,787	5,253	10,040	4,994	3,498	8,493	(208)	1,755	1,547
Delaware									
Central Pencader	5,815	21,457	27,272	5,953	14,888	20,840	(137)	6,569	6,432
New Castle	5,250	8,021	13,272	5,397	5,088	10,484	(147)	2,934	2,787
Smyrna	2,010	7,304	9,314	2,225	5,388	7,613	(215)	1,915	1,701
12 Towns	68,480	95,662	164,142	67,602	67,715	135,317	877	27,947	28,824

Source: As per model and calculations in text.

TABLE IV—4
State Road Infrastructure Required (Lane Miles)
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

State Roads (Lane Miles)

Municipality	STATUS QUO: Near Existing Development	STATUS QUO: Less Developed Peripheral Areas	STATUS QUO: Total	CCMP: Near Existing Development	CCMP: Less Developed Peripheral Areas	CCMP: Total	Difference (STATUS QUO minus CCMP): Near Existing Development	Difference (STATUS QUO minus CCMP): Less Developed Peripheral Areas	Difference (STATUS QUO minus CCMP): Total
New Jersey									
Bridgeton	0.30	0.25	0.55	0.30	0.24	0.54	0.01	0.00	0.01
Chesterfield	3.04	6.06	9.09	3.01	6.04	9.05	0.03	0.01	0.04
Commercial	0.45	0.90	1.34	0.46	0.89	1.35	-0.01	0.00	-0.01
Pennsauken	1.34	2.65	3.99	1.26	2.46	3.72	0.08	0.19	0.27
West Deptford	0.19	3.78	3.97	0.04	3.80	3.84	0.15	-0.02	0.14
Pennsylvania									
Bensalem	3.75	1.02	4.78	3.68	0.67	4.35	0.08	0.35	0.43
Chester	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
East Coventry	0.24	0.99	1.24	0.16	0.99	1.15	0.09	0.00	0.09
Whitpain	0.97	1.77	2.74	0.95	1.66	2.61	0.02	0.11	0.13
Delaware									
Central Pencader	1.43	8.77	10.20	0.17	8.73	8.90	1.26	0.04	1.30
New Castle	1.29	3.28	4.57	0.60	3.23	3.83	0.69	0.05	0.74
Smyrna	0.49	2.99	3.48	0.40	2.89	3.29	0.10	0.10	0.19
12 Towns	13.50	32.45	45.96	11.02	31.61	42.63	2.48	0.84	3.33

State Road Cost (000$)

Municipality	STATUS QUO: Near Existing Development	STATUS QUO: Less Developed Peripheral Areas	STATUS QUO: Total	CCMP: Near Existing Development	CCMP: Less Developed Peripheral Areas	CCMP: Total	Difference (STATUS QUO minus CCMP): Near Existing Development	Difference (STATUS QUO minus CCMP): Less Developed Peripheral Areas	Difference (STATUS QUO minus CCMP): Total
New Jersey									
Bridgeton	342	222	564	337	218	555	6	3	9
Chesterfield	3,418	5,451	8,869	3,388	5,439	8,827	30	12	42
Commercial	501	807	1,308	515	803	1,318	(15)	4	(10)
Pennsauken	1,506	2,387	3,893	1,417	2,216	3,633	88	171	260
West Deptford	217	3,403	3,620	47	3,417	3,464	170	(14)	156
Pennsylvania									
Bensalem	3,590	782	4,372	3,517	511	4,028	73	271	344
Chester	-	-	-	-	-	-	-	-	-
East Coventry	233	759	992	150	758	908	83	1	84
Whitpain	927	1,353	2,280	908	1,272	2,179	20	81	101
Delaware									
Central Pencader	1,127	5,526	6,653	133	5,502	5,635	994	24	1,018
New Castle	1,017	2,066	3,083	472	2,034	2,506	545	31	577
Smyrna	389	1,881	2,270	312	1,821	2,133	77	60	138
12 Towns	13,267	24,637	37,904	11,196	23,990	35,185	2,071	647	2,718

Source: As per model and calculations in text.

well as the tax-paying public. Nonetheless, there are significant local road-cost savings regardless of who pays for these costs.

State Lane-Miles Required (Table IV-4)

As would be expected, differing land-use patterns at the community level affect state road demand only slightly. Most state roads are through-roads linking existing population centers. Whether in-between locations are more compact or population growth is more dispersed does not significantly affect the scale or direction of these center-linking roads.

Under *STATUS QUO* development, slightly less than 46.0 lane-miles of state roads would have to be provided or augmented to accommodate twenty-five-year study community growth; under *CCMP* development, the figure would be 42.6 lane-miles. The difference is approximately 3.3 lane-miles and relates largely to development differences near existing development.

Cost of State Lane-Miles Required (Table IV-4)

The difference between STATUS QUO and CCMP development in state roads in the estuary would amount to $2.7 million. *STATUS QUO* development would require $37.9 million to construct or augment necessary state roads; *CCMP* development would require $35.2 million for the same purposes. Obviously, the savings in state road costs are much less than those observed for local roads.

RESULTS OF THE ASSESSMENT: UTILITY INFRASTRUCTURE REQUIREMENTS AND COSTS

Water-based utility requirements vary directly with water and sewer demand (Rainer 1990). Water demand relates to the number of people in a dwelling unit or per 1,000 square feet of nonresidential space and to the degree that the properties they occupy have lawns that are regularly watered (Boland 1983). Water service is people- and property-driven, and models or standards of use by type take both of these types of demand into account. Water-service hookups are primarily an urban service; those peripheral to existing development areas use well water.

Sewer[5] demand is a function of the number of gallons of occupant-driven water consumption that is retained in the system and ultimately must be disposed of (New Jersey Office of State Planning 1990). This usually varies from 70 to 90 percent of total water consumption for residential and nonresidential

5 This section involves only sanitary sewers.

uses. Sewer hookups are also an urban service, with packaged sewer treatment plants available to larger, peripheral subdivisions and septic systems to rural development on individual large lots. Thus, for the most part, water and sewer service is fully available near existing development. Sewer service is often also available to large subdivisions not far from existing development, where water service may be in the form of drilled wells. In very rural areas, water demand is predominantly answered by drilled wells, and sewer treatment is responded to in the form of septic systems.

Water and Sewer Demand

Water demand in millions of gallons per day is somewhat less under CCMP versus STATUS QUO development due to differences in density (smaller lots under CCMP development near existing development) and also due to somewhat different housing types—possibly more townhouse and multifamily development under CCMP development, at least in the more developed communities. Water demand by type of residential unit and nonresidential use is shown below.

Sewer demand parallels water demand and involves lower amounts consumed because all of the water used is not retained in the system. Housing-type differences and densities in STATUS QUO versus CCMP development also affect sewer demand. Differences in water and sewer demand by residential and nonresidential type are shown in the following chart.

Structure Type	Water Demand	Sewer Demand
RESIDENTIAL	(gallons/person/day)	(gallons/person/day)
Single-family	100	65
Townhouse/Duplex	85	56
Multifamily	75	52
NONRESIDENTIAL	(gallons/1,000 ft.^{2})	(gallons/1,000 ft.^{2})
Office	93	80
Retail	106	90
Industrial	225 †	195
Warehouse	225 †	195
Agriculture	225 †	195

† Process water is not calculated in this analysis.

Water and Sewer Trunk Line Connections (Hookups)

Water and sewer trunk line connections (hookups) are usually paid for by the developer. They are, however, a surrogate for the public costs of distribution and maintenance and are counted in this assessment. It is assumed that there will be water and sewer hookups according to the following schedule:

Structure Type	Hookups (Trunk Line Connections)
RESIDENTIAL	
Single-family	1 for 1 unit
Townhouse/Duplex	1 for 2 units
Multifamily	1 for 4 units
NONRESIDENTIAL	
Office	1 per 25,000 ft.^{2}
Retail	1 per 10,000 ft.^{2}
Industrial	1 per 10,000 ft.^{2}
Warehouse	1 per 50,000 ft.^{2}
Agriculture	1 per 5,000 ft.^{2}

Water and sewer hookups are fully counted for each unit developed near existing development. In peripheral rural areas, units on more than 1- to 5-acre lots are counted to have a water hookup but no sewer hookup. For those units on lot sizes of more than 5 acres, again in rural areas, no water or sewer hookups are envisioned or counted.

Water and Sewer Costs

Water and sewer service will be provided to most new users as a shared cost of the existing system. The number of existing hookups divided into the overall share of water and sewer costs for treatment and distribution represents these latter costs expressed per hookup. It is an estimate of future distribution costs to the provider. Current estimates are $1,000 per water hookup for urban locations and $2,000 per hookup for rural locations. The urban and rural distribution costs per sewer hookup are $2,000 and $2,500, respectively (New Jersey Office of State Planning 1990).

Near existing development, under the CCMP scenario, 10-percent clustering of single-family units reduces water and sewer (distribution) costs by 0.6 percent for these units. This is because distribution costs represent 40 percent of overall costs, and these can be reduced by 15 percent through clustering in the 10 percent of single-family units where this occurs (.40 x .15 x .10). In rural areas there is 20-percent clustering under CCMP development, representing a 1.2-percent saving (.40 x .15 x .20).

STATUS QUO versus CCMP Development

Water Demand and Hookups (Table IV-5)

Water demand under STATUS QUO development is 3.58 billion gallons per year; under CCMP it is almost identical, at 3.52 billion gallons per year. The difference in consumption is about 60 million gallons per year. Under STATUS QUO development, 28,600 hookups are required; under CCMP, 27,000 hookups—a difference of about 1,600 hookups. This overall difference is related to CCMP and STATUS QUO development differences in peripheral locations.

Water Costs (Table IV-5)

Water costs amount to $48.6 million under STATUS QUO development and $39.5 million under CCMP—a savings of $9.1 million. This cost difference also relates primarily to development differences of the two scenarios in peripheral locations.

Sewer Demand and Hookups (Table IV-6)

Sewer demand in billions of gallons per year is 2.50 under STATUS QUO and 2.42 under CCMP—a difference of 74 million gallons per year. The difference in sewer hookups is 530 more than the difference in water hookups—2,130 versus 1,600—because less public water than sewer service is found in peripheral areas of the estuary.

Sewer Costs (Table IV-6)

The difference in sewer costs between the two development scenarios is approximately $8.3 million. All of the difference relates to differences in peripheral development areas under CCMP versus STATUS QUO development patterns. This is where development levels under CCMP development are about 60 percent those of STATUS QUO development.

TABLE IV–5
Water Capacity, Hookups and Costs
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Water Demand (KGY)

Municipality	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	66,495	30,354	96,849	81,431	25,027	106,458	(14,936)	5,327	(9,609)
Chesterfield	190,000	60,670	250,670	189,826	41,382	231,208	174	19,288	19,462
Commercial	41,382	29,372	70,754	55,268	15,252	70,520	(13,887)	14,121	234
Pennsauken	257,297	280,839	538,136	322,913	167,054	489,967	(65,615)	113,784	48,169
West Deptford	20,726	229,192	249,918	67,250	171,915	239,165	(46,524)	57,277	10,753
Pennsylvania									
Bensalem	403,009	71,071	474,080	427,953	21,879	449,832	(24,945)	49,192	24,248
Chester	(136,793)	(14,970)	(151,763)	(54,287)	(0)	(54,287)	(82,506)	(14,970)	(97,476)
East Coventry	7,878	15,765	23,642	11,936	9,852	21,788	(4,058)	5,912	1,854
Whitpain	88,052	163,307	251,359	125,963	101,554	227,518	(37,911)	61,753	23,841
Delaware									
Central Pencader	208,432	853,705	1,062,137	510,315	528,238	1,038,553	(301,883)	325,467	23,584
New Castle	177,883	401,173	579,056	352,748	217,669	570,417	(174,865)	183,504	8,639
Smyrna	38,912	92,560	131,472	69,406	57,655	127,061	(30,494)	34,905	4,411
12 Towns	1,363,271	2,213,038	3,576,309	2,160,722	1,357,478	3,518,200	(797,451)	855,560	58,109

Water Hookups (#)

Municipality	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	183	325	508	241	273	514	(58)	52	(6)
Chesterfield	461	599	1,060	601	417	1,019	(140)	182	42
Commercial	373	294	667	478	150	628	(104)	143	39
Pennsauken	1,099	659	1,757	1,319	359	1,677	(220)	300	80
West Deptford	224	2,165	2,389	638	1,664	2,302	(414)	501	87
Pennsylvania									
Bensalem	2,073	533	2,606	2,138	243	2,381	(65)	289	225
Chester	-	-	-	-	-	-	-	-	-
East Coventry	42	164	206	87	104	191	(44)	59	15
Whitpain	642	1,651	2,294	924	1,082	2,006	(282)	569	287
Delaware									
Central Pencader	1,811	8,595	10,405	4,431	5,435	9,866	(2,620)	3,160	540
New Castle	1,230	4,050	5,280	2,790	2,218	5,009	(1,561)	1,831	271
Smyrna	427	1,004	1,430	767	635	1,402	(341)	369	29
12 Towns	8,565	20,038	28,603	14,414	12,582	26,995	(5,849)	7,456	1,607

TABLE IV–5 (continued)
Water Capacity, Hookups and Costs
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Water Costs (000$)

Municipality	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	183	650	833	241	547	788	(58)	103	45
Chesterfield	461	1,199	1,660	601	834	1,436	(140)	364	224
Commercial	373	587	961	478	301	779	(104)	287	182
Pennsauken	1,099	1,318	2,416	1,319	717	2,036	(220)	600	380
West Deptford	224	4,329	4,554	638	3,328	3,966	(414)	1,001	587
Pennsylvania									
Bensalem	2,073	1,065	3,139	2,138	487	2,625	(65)	579	514
Chester	-	-	-	-	-	-	-	-	-
East Coventry	42	327	370	87	209	295	(44)	119	74
Whitpain	642	3,303	3,945	924	2,164	3,088	(282)	1,139	857
Delaware									
Central Pencader	1,811	17,189	19,000	4,431	10,870	15,301	(2,620)	6,320	3,699
New Castle	1,230	8,100	9,329	2,790	4,437	7,227	(1,561)	3,663	2,102
Smyrna	427	2,008	2,434	767	1,269	2,036	(341)	739	398
12 Towns	8,565	40,076	48,640	14,414	25,163	39,577	(5,849)	14,912	9,063

Source: As per model and calculations in text.

TABLE IV–6
Sanitary Sewer Capacity, Hookups, and Costs
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Sanitary Sewer Demand (KGY)

	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
Municipality	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	53,753	19,730	73,483	65,577	16,268	81,845	(11,824)	3,462	(8,361)
Chesterfield	157,940	-	157,940	154,471	-	154,471	3,468	-	3,468
Commercial	26,996	19,194	46,189	36,218	731	36,949	(9,222)	18,462	9,240
Pennsauken	201,816	234,602	436,418	257,915	140,174	398,090	(56,099)	94,427	38,328
West Deptford	13,488	157,336	170,824	45,333	117,856	163,190	(31,846)	39,480	7,635
Pennsylvania									
Bensalem	309,207	51,416	360,623	328,594	14,221	342,815	(19,387)	37,194	17,807
Chester	(90,848)	(9,872)	(100,720)	(36,677)	(0)	(36,677)	(54,170)	(9,872)	(64,042)
East Coventry	5,947	-	5,947	8,555	-	8,555	(2,608)	-	(2,608)
Whitpain	62,204	107,361	169,565	88,185	66,010	154,195	(25,980)	41,350	15,370
Delaware									
Central Pencader	137,785	556,472	694,256	336,025	344,111	680,136	(198,241)	212,361	14,120
New Castle	128,417	266,057	394,474	244,147	144,905	389,051	(115,730)	121,152	5,422
Smyrna	25,515	61,054	86,569	45,553	2,695	48,248	(20,037)	58,359	38,321
12 Towns	1,032,219	1,463,349	2,495,568	1,573,895	846,972	2,420,867	(541,676)	616,377	74,701

Sanitary Sewer Hookups (#)

	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
Municipality	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	183	325	508	241	273	514	(58)	52	(6)
Chesterfield	461	-	461	601	-	601	(140)	-	(140)
Commercial	373	294	667	478	1	479	(104)	292	188
Pennsauken	1,099	659	1,757	1,319	359	1,677	(220)	300	80
West Deptford	224	2,165	2,389	638	1,664	2,302	(414)	501	87
Pennsylvania									
Bensalem	2,073	533	2,606	2,138	243	2,381	(65)	289	225
Chester	-	-	-	-	-	-	-	-	-
East Coventry	42	-	42	87	-	87	(44)	-	(44)
Whitpain	642	1,651	2,294	924	1,082	2,006	(282)	569	287
Delaware									
Central Pencader	1,811	8,595	10,405	4,431	5,435	9,866	(2,620)	3,160	540
New Castle	1,230	4,050	5,280	2,790	2,218	5,009	(1,561)	1,831	271
Smyrna	427	1,004	1,430	767	15	782	(341)	989	648
12 Towns	8,565	19,275	27,840	14,414	11,292	25,706	(5,849)	7,983	2,134

TABLE IV—6 (continued)
Sanitary Sewer Capacity, Hookups, and Costs
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Sanitary Sewer Costs (000$)

Municipality	STATUS QUO			CCMP			Difference (STATUS QUO minus CCMP)		
	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total	Near Existing Development	Less Developed Peripheral Areas	Total
New Jersey									
Bridgeton	366	813	1,178	482	684	1,165	(116)	129	13
Chesterfield	922	-	922	1,203	-	1,203	(281)	-	(281)
Commercial	747	734	1,481	956	4	959	(209)	731	522
Pennsauken	2,197	1,647	3,844	2,638	897	3,534	(440)	750	310
West Deptford	448	5,412	5,860	1,276	4,160	5,436	(827)	1,251	424
Pennsylvania									
Bensalem	4,147	1,332	5,478	4,276	608	4,884	(129)	723	594
Chester	-	-	-	-	-	-	-	-	-
East Coventry	84	-	84	173	-	173	(89)	-	(89)
Whitpain	1,284	4,128	5,413	1,848	2,705	4,554	(564)	1,423	859
Delaware									
Central Pencader	3,622	21,487	25,108	8,862	13,587	22,449	(5,240)	7,899	2,659
New Castle	2,460	10,125	12,584	5,581	5,546	11,127	(3,121)	4,579	1,457
Smyrna	853	2,510	3,363	1,534	38	1,573	(681)	2,472	1,790
12 Towns	17,130	48,187	65,316	28,828	28,229	57,057	(11,698)	19,958	8,260

Source: As per model and calculations in text.

RESULTS OF THE ASSESSMENT: HOUSING COST DIFFERENCES

Definitions

Housing costs are the selling prices or values of single-family homes and townhouses/duplexes as well as the capitalized value of multifamily units (100 x monthly rent) (Beaton 1991). Housing costs in 1994 were obtained from knowledgeable professionals in each community of the Delaware Estuary. For 1990, the value of single-family homes and the median gross rents of various types of units available for rent were obtained from the U.S. Census.

In the Delaware Estuary, housing values average approximately $150,000 (± $100,000) for a new single-family home near existing development in a study community, and 1.5 times this amount peripheral to existing development. New rental units rent for $500 ± $200 for a one-bedroom unit and $700 ± $300 for a two-bedroom unit near existing development.

Components of Housing Costs

The cost of a housing unit involves land and processing costs as well as structure costs. In the average case, for a single-family home the land and processing cost is about 25 percent of total costs; for a townhouse/duplex, it is 20 percent; and for a multifamily unit, land represents 10 percent of total costs.

Housing cost changes relative to growth management impacts comprise primarily the land component of overall housing costs (Pollakowski and Wachter 1990). If density is increased near existing development under CCMP development, theoretically housing costs will decrease. On the other hand, if density is reduced in the peripheral rural areas, housing costs will rise.

To calculate the effects of CCMP versus STATUS QUO development on housing costs, the value of new housing of various types by community of the Delaware Estuary had to be established. This was done by obtaining input from knowledgeable professionals in each community and checking the relationships of housing value across communities reported by these professionals in 1995 against relationships of housing value across communities observed by the U.S. Census in 1990.

The 1995 values by structure type, including the value of multifamily units determined by multiplying monthly rent by 100, were disaggregated into land and structure components according to the relationships discussed above. Thus, if a new single-family home in the Central Pencader Division (DE) was $150,000,

$112,500 was assumed to be structure cost and $37,500 land cost. If the density was *increased* by 30 percent near existing development under the CCMP scenario, the land portion was *decreased* per unit by that amount, and a new price was calculated. In this case, it would be $112,500 (structure) + $26,250 (land), or $138,750 (total value).

If, on the other hand, density was *decreased* from three units per acre to two units per acre, the land component cost of the developed unit was increased by one-third. A cap of three times was applied, as in each case the resulting land parcel would yield the same number of units and the extra land would be worth marginally less. This adjustment was done for all units of all types in the study communities for CCMP development, and the results were averaged and compared to average selling prices or values for STATUS QUO development in the study communities.

STATUS QUO versus CCMP Development

Housing Costs (Table IV-7)

Housing costs are $2,000 to $30,000 lower near existing development across study communities of the Delaware Estuary under CCMP development and $8,000 to $46,000 higher in peripheral rural areas. In general, because a majority of units are built near existing development (i.e., six out of every ten units), housing costs reflect this distribution and are, on average, $15,860 less under CCMP development than under STATUS QUO. This, applied against an average new housing cost of $190,000 under STATUS QUO development, results in an average savings of 8.4 percent.

RESULTS OF THE ASSESSMENT: FISCAL IMPACT ANALYSIS

There are a number of procedures that may be used to undertake a fiscal impact analysis. Inherent to all, however, is a basic measurement of development-generated costs versus revenues to the jurisdiction(s) that will be impacted by the development. Locationally, fiscal impact analyses usually project impact to the local providers of basic services, i.e., the municipality, for public safety, public workers, administration, recreation services, and so on; and the school district, for primary and secondary educational services.[6]

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6 Incorporated localities are providers of most municipal- and school district-type services for developing areas in New Jersey and Pennsylvania. In Delaware, it is the surrounding county and the state.

TABLE IV–7
Housing and Nonresidential Costs
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Average Housing Costs ($)

Municipality	STATUS QUO: Near Existing Development	STATUS QUO: Less Developed Peripheral Areas	STATUS QUO: Total	CCMP: Near Existing Development	CCMP: Less Developed Peripheral Areas	CCMP: Total	Difference (STATUS QUO minus CCMP): Near Existing Development	Difference (STATUS QUO minus CCMP): Less Developed Peripheral Areas	Difference (STATUS QUO minus CCMP): Total
New Jersey									
Bridgeton	45,000	80,000	66,000	43,313	88,000	65,656	1,688	(8,000)	344
Chesterfield	210,000	250,000	238,000	190,575	285,938	238,256	19,425	(35,938)	(256)
Commercial	70,500	125,000	92,300	65,683	159,375	84,421	4,817	(34,375)	7,879
Pennsauken	120,000	145,000	127,500	109,471	140,469	114,121	10,529	4,531	13,379
West Deptford	158,000	200,000	195,800	143,740	220,000	197,122	14,260	(20,000)	(1,322)
Pennsylvania									
Bensalem	145,000	175,000	151,000	133,269	192,500	139,192	11,731	(17,500)	11,808
Chester	38,000	60,000	40,200	35,540	N/A	35,540	2,460	N/A	4,660
East Coventry	195,000	215,000	211,000	185,625	246,761	219,250	9,375	(31,761)	(8,250)
Whitpain	240,000	325,000	299,500	215,135	371,719	293,427	24,865	(46,719)	6,073
Delaware									
Central Pencader	131,250	200,000	186,250	122,084	228,750	175,417	9,166	(28,750)	10,833
New Castle	117,500	175,000	160,625	109,233	204,750	147,440	8,267	(29,750)	13,185
Smyrna	130,000	120,000	123,000	123,750	130,909	126,972	6,250	(10,909)	(3,972)
12 Towns	161,308	199,406	189,191	130,207	226,829	173,332	31,100	(27,423)	15,859

Average Nonresidential Costs ($ for 1000 sq.ft.)

Municipality	STATUS QUO: Near Existing Development	STATUS QUO: Less Developed Peripheral Areas	STATUS QUO: Total	CCMP: Near Existing Development	CCMP: Less Developed Peripheral Areas	CCMP: Total	Difference (STATUS QUO minus CCMP): Near Existing Development	Difference (STATUS QUO minus CCMP): Less Developed Peripheral Areas	Difference (STATUS QUO minus CCMP): Total
New Jersey									
Bridgeton	69,511	-	69,511	68,880	-	68,880	632	-	632
Chesterfield	68,484	-	68,484	67,861	-	67,861	623	-	623
Commercial	-	71,957	71,957	66,846	72,676	70,344	N/A	(720)	N/A
Pennsauken	64,323	65,353	64,941	63,739	66,006	64,646	585	(654)	295
West Deptford	-	62,899	62,899	61,032	63,528	63,028	N/A	(629)	N/A
Pennsylvania									
Bensalem	56,219	56,944	56,291	55,708	-	55,708	511	56,944	584
Chester	59,915	61,114	59,975	-	-	-	N/A	N/A	N/A
East Coventry	47,652	-	47,652	47,219	-	47,219	433	-	433
Whitpain	61,009	62,118	61,231	60,454	-	60,454	555	N/A	N/A
Delaware									
Central Pencader	51,335	53,046	52,191	50,868	53,577	51,545	467	(530)	645
New Castle	51,335	52,856	51,791	50,868	53,385	51,372	467	(529)	420
Smyrna	57,612	57,169	57,258	57,089	57,741	57,480	524	(572)	(222)
12 Towns	60,874	62,465	61,415	60,238	63,526	60,922	635	(1,061)	493

Source: As per model and calculations in text.

Fiscal impact procedures typically apply average-costing techniques. Average-costing techniques concentrate on demand units as the source of future costs. Public service demand units in the form of future residents, public school children, and workers are projected, and these are multiplied by the current average cost per unit to provide such services. This produces the cost associated with the development. Revenue impacts are derived by estimating the value of newly improved property to the servicing districts and multiplying this figure by the current tax rates these districts levy. Together with non-tax revenues, including intergovernmental aid, these constitute locally generated revenues. The approach described here is the Per Capita Multiplier Method developed by Rutgers University and currently used throughout the United States as the most basic form of fiscal impact evaluation (Burchell et al. 1994). This method is the one that will be employed in this study.

The demand for municipal and school services is primarily related to the number of people and public school children in a dwelling unit. Both future residents and public school children can be predicted by surveys of similar types of dwelling units. These surveys yield demographic multipliers, i.e., the number of people and public school children per dwelling unit. The primary source of survey data for demographic multipliers is the U.S. Census. This information is based on large and reliable surveys and is available by bedroom count. Earlier in this section, demographic multipliers for household size (future residents) and public school-age children (future public school children) derived from the 1990 U.S. Census (Public Use Microdata Sample {PUMS}) were presented.

The demand for municipal services is not only related to the number of persons who reside in the community but also to the number of employees who work there. Future service demand must also take into account newly arriving employees. Also presented earlier were the amounts of square feet per employee by type of nonresidential space.

STATUS QUO Versus CCMP Development

Total Municipal and School District Public Costs (Table IV-9)

The resulting total municipal and school district costs, obtained by applying the per capita/per public school pupil servicing costs (Table IV-8) to the projections of future residents/workers and public school children under STATUS QUO and CCMP development scenarios, are shown in Table IV–9. For the STATUS QUO development alternative, annual municipal costs in the year

TABLE IV—8
Fiscal Base Data for Municipalities and School Districts
Selected Delaware Estuary Municipalities

Municipalities

Municipality	Current Cost per Person	Current Cost per Employee	General Tax Rate	Current Tax Base (Market) per Person EXIST	New Tax Base (Market) per Person STATUS QUO	New Tax Base (Market) per Person CCMP	Equalization Ratio	Percent Revenue Nonproperty Tax
New Jersey								
Bridgeton	542	242	0.009360	15,907	20,669	20,830	0.96	0.75
Chesterfield	239	143	0.000900	29,685	67,042	67,114	1.10	0.88
Commercial	366	284	0.005610	21,437	27,389	26,137	0.93	0.71
Pennsauken	544	245	0.015940	30,806	36,638	33,764	0.38	0.65
West Deptford	512	289	0.003900	50,294	55,311	56,482	1.14	0.56
Pennsylvania								
Bensalem	148	68	0.034750	39,553	44,543	42,437	0.05	0.56
Chester	634	281	0.929030	6,484	14,633	14,578	0.03	0.70
East Coventry	130	116	0.011000	48,627	59,437	61,761	0.07	0.74
Whitpain	192	102	0.010000	61,639	86,187	86,941	0.05	0.84
Delaware								
Central Pencader	322	143	0.004340	58,228	53,437	52,153	0.45	0.65
New Castle	322	143	0.004340	58,228	46,300	44,327	0.45	0.65
Smyrna	258	114	0.003475	38,000	34,648	35,767	0.50	0.70

School Districts

Municipality	Current Cost per Pupil	General Tax Rate	Current Tax Base (Market) per Person EXIST	New Tax Base (Market) per Person STATUS QUO	New Tax Base (Market) per Person CCMP	Equalization Ratio	Percent Revenue Nonproperty Tax
New Jersey							
Bridgeton	9,582	0.010100	96,791	248,203	284,670	0.96	0.90
Chesterfield	8,726	0.007457	646,353	604,491	579,912	1.10	0.26
Commercial	10,457	0.010730	160,594	133,144	138,750	0.93	0.85
Pennsauken	8,126	0.037790	272,671	570,005	542,394	0.38	0.51
West Deptford	8,333	0.011300	379,217	286,183	294,108	1.14	0.42
Pennsylvania							
Bensalem	7,871	0.273000	361,906	360,804	368,687	0.05	0.35
Chester	6,727	0.770660	148,953	95,572	91,514	0.03	0.58
East Coventry	8,446	0.217000	402,612	288,435	299,501	0.07	0.26
Whitpain	10,133	0.232850	670,230	422,527	444,527	0.05	0.18
Delaware							
Central Pencader	5,627	0.006750	292,649	247,572	251,969	0.43	0.86
New Castle	4,933	0.001100	362,760	242,615	244,929	0.51	0.96
Smyrna	6,802	0.006617	188,839	167,761	172,913	0.43	0.92

Source: As per model and calculations in text.

TABLE IV–9
Annual Fiscal Impact ($)–2020
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

Total - Municipality and School District

Municipality	STATUS QUO Added Costs	STATUS QUO Added Revenues	STATUS QUO Fiscal Impact	CCMP Added Costs	CCMP Added Revenues	CCMP Fiscal Impact	Difference (CCMP - STATUS QUO) Fiscal Impact
New Jersey							
Bridgeton	4,586,821	6,391,947	1,805,126	3,879,728	6,673,248	2,793,520	988,394
Chesterfield	7,694,420	8,761,126	1,066,707	7,289,412	8,277,783	988,372	(78,335)
Commercial	6,365,391	6,389,474	24,083	5,068,647	5,963,730	895,083	870,999
Pennsauken	13,818,767	23,050,682	9,231,914	12,692,428	21,166,721	8,474,293	(757,622)
West Deptford	22,109,624	18,351,187	(3,758,436)	19,563,278	17,923,642	(1,639,637)	2,118,800
Pennsylvania							
Bensalem	15,642,206	16,252,133	609,927	13,712,175	14,792,450	1,080,275	470,347
Chester	(8,283,445)	(12,408,949)	(4,125,503)	(2,534,369)	(4,201,771)	(1,667,401)	2,458,102
East Coventry	1,573,788	1,098,799	(474,989)	1,405,008	1,047,878	(357,131)	117,858
Whitpain	20,756,675	14,799,468	(5,957,207)	17,499,253	13,323,565	(4,175,689)	1,781,518
Delaware							
Central Pencader	62,116,137	62,073,504	(42,633)	56,512,093	58,632,327	2,120,233	2,162,867
New Castle	28,112,143	24,466,875	(3,645,267)	24,433,023	23,062,881	(1,370,142)	2,275,126
Smyrna	9,757,966	9,097,647	(660,320)	9,305,618	8,947,006	(358,612)	301,708
12 Towns	184,250,493	178,323,895	(5,926,598)	168,826,294	175,609,458	6,783,164	12,709,762

Municipality

Municipality	STATUS QUO Added Costs	STATUS QUO Added Revenues	STATUS QUO Fiscal Impact	CCMP Added Costs	CCMP Added Revenues	CCMP Fiscal Impact	Difference (CCMP - STATUS QUO) Fiscal Impact
New Jersey							
Bridgeton	1,194,783	2,207,229	1,012,446	1,097,814	2,398,392	1,300,579	288,133
Chesterfield	1,467,304	3,012,156	1,544,852	1,401,433	2,821,372	1,419,939	(124,913)
Commercial	923,286	1,190,865	267,580	784,577	1,144,141	359,565	91,985
Pennsauken	5,147,271	9,817,936	4,670,665	4,724,015	8,950,868	4,226,853	(443,812)
West Deptford	5,361,699	5,208,217	(153,482)	4,980,344	5,126,237	145,893	299,374
Pennsylvania							
Bensalem	1,784,739	2,550,877	766,138	1,631,695	2,332,678	700,982	(65,155)
Chester	(3,133,656)	(6,870,751)	(3,737,095)	(941,837)	(2,298,816)	(1,356,980)	2,380,116
East Coventry	113,232	127,103	13,872	105,445	122,127	16,682	2,811
Whitpain	1,813,000	2,504,741	691,741	1,648,557	2,270,527	621,969	(69,772)
Delaware							
Central Pencader	13,022,949	13,059,471	36,522	12,515,515	12,620,343	104,828	68,306
New Castle	7,062,501	6,394,306	(668,195)	6,479,498	6,172,898	(306,600)	361,596
Smyrna	1,794,945	1,503,912	(291,033)	1,753,739	1,489,634	(264,105)	26,928
12 Towns	36,552,053	40,706,063	4,154,010	36,180,796	43,150,401	6,969,605	2,815,595

Source: As per model and calculations in text.

TABLE IV—9 (continued)
Annual Fiscal Impact ($)–2020
STATUS QUO (Trend) Versus CCMP (Planned) Growth
Selected Delaware Estuary Municipalities

School District	STATUS QUO			CCMP			Difference (CCMP - STATUS QUO)
Municipality	Added Costs	Added Revenues	Fiscal Impact	Added Costs	Added Revenues	Fiscal Impact	Fiscal Impact
New Jersey							
Bridgeton	3,392,038	4,184,718	792,680	2,781,914	4,274,855	1,492,941	700,261
Chesterfield	6,227,116	5,748,970	(478,145)	5,887,978	5,456,411	(431,567)	46,578
Commercial	5,442,105	5,198,609	(243,496)	4,284,071	4,819,589	535,518	779,014
Pennsauken	8,671,496	13,232,745	4,561,249	7,968,413	12,215,853	4,247,440	(313,810)
West Deptford	16,747,925	13,142,970	(3,604,955)	14,582,934	12,797,405	(1,785,529)	1,819,425
Pennsylvania							
Bensalem	13,857,467	13,701,257	(156,210)	12,080,480	12,459,772	379,292	535,502
Chester	(5,149,789)	(5,538,197)	(388,408)	(1,592,532)	(1,902,954)	(310,422)	77,986
East Coventry	1,460,556	971,696	(488,860)	1,299,563	925,750	(373,813)	115,047
Whitpain	18,943,675	12,294,727	(6,648,948)	15,850,696	11,053,038	(4,797,658)	1,851,290
Delaware							
Central Pencader	49,093,189	49,014,033	(79,155)	43,996,578	46,011,984	2,015,406	2,094,561
New Castle	21,049,641	18,072,569	(2,977,072)	17,953,525	16,889,983	(1,063,542)	1,913,530
Smyrna	7,963,021	7,593,734	(369,287)	7,551,879	7,457,372	(94,507)	274,780
12 Towns	147,698,440	137,617,832	(10,080,608)	132,645,498	132,459,057	(186,441)	9,894,167

2020 amount to $36.6 million; annual school outlays in that year amount to $147.7 million. For the CCMP scenario, municipal and school costs are projected at $36.2 million and $132.6 million, respectively, for the same year. In both cases, the municipal expenditures are generated predominantly by the residential uses; this is exclusively the case with respect to school costs.

The costs indicated above are annually recurring expenditures expressed in 1995 dollars. They contain within them both statutory or benefit packages, as well as debt service outlays for capital expenditures.

Total Municipal and School District Public Revenues (Table IV-9)

Municipal and school district revenues focus on two basic sources: property tax revenues and non-property tax revenues, including intergovernmental aid. Property tax revenues are based on equalized property values and property tax rates across study communities.

Non-property tax revenues for the municipality consist of payments for licenses, permits, fines, interest on investment, fees, public utility revenues, delinquent taxes collected, and numerous other sources. The current levels are expressed per $1,000 valuation or per capita and are either projected into the future relative to the development-generated growth of property value or new residents, or left unchanged by either.

The major school non-property tax revenue is state school aid. This is projected on a per student basis.

For the STATUS QUO scenario, total public revenues accruing to the municipalities as a result of development by the year 2020 are $40.7 million annually. Total school district revenues contributed by the development under this scenario are $137.6 million annually.

For the CCMP scenario, development generates $43.2 million in annual municipal revenues at 2020 and $132.5 million in annual school district revenues.

Net Fiscal Impact–Summary (Table IV-9)

The bottom line of a fiscal impact analysis is the net cost versus revenue of a development scenario. This is presented for the Delaware Estuary for the two scenarios in the last column of Table IV–9. The final column of this exhibit in the extreme right-hand corner is the difference of aggregate fiscal impacts. This number is determined by subtracting growth-generated costs from growth-generated revenues under each development scenario and further subtracting the

net fiscal impact observed under CCMP from that observed under STATUS QUO. The overall difference, favoring CCMP development, is $12.7 million annually (6.9 percent of STATUS QUO costs) at 2020. *Fiscal impacts are overall positive only under the CCMP development scenario.* The net fiscal benefit is $2.8 million annually to study community municipalities and $9.9 million annually to study community school districts.

SUMMARY: CONCLUSIONS IN CONTEXT

What is the bottom line of the analyses undertaken in this section? First, across a variety of impacts of STATUS QUO versus CCMP growth, CCMP growth in the Delaware Estuary can perform demonstrably better. The results for the study communities of the Delaware Estuary are summarized on the following page and are presented together with results found elsewhere nationally.

Planned versus Trend Growth: Findings of the Field Nationally		**CCMP versus STATUS QUO Growth: Findings in the Delaware Estuary**	
Area of Impact	*Savings: Planned over Trend*	*Area of Impact*	*Savings: CCMP over STATUS QUO*
Developable Land	43.5%	Developable Land	20.5%
Infrastructure Roads (local) Utilities (water/sewer)	 25%* 15%	Infrastructure Roads (local) Utilities (water/sewer) (hookups)	 19.7% 6.7%
Housing Costs	5%	Housing Costs	8.4%
Fiscal Impacts	2%	Fiscal Impacts	6.9%

*Three studies summarized; for other areas of impact, the New Jersey State Development and Redevelopment Plan (AIPLAN) Impact Assessment is the primary source.

What is obvious from the above table is that CCMP development, if implemented according to the descriptions contained herein, has the capacity to save more than 20 percent in developable land, 20 percent in local roads, and 7 per-

cent in water-based development utilities. There is also a possibility of a moderate (7–8 percent) savings in overall housing costs and fiscal impacts.

What is the significance of these savings, and what do they mean when distributed over twelve study communities that could be close to 380,000 in population, or 137,500 households, by the year 2020? It does not mean that each existing household could be saved 1,000 square feet of land, or $200 in local road costs (regardless of who pays for them); it means much more. The significance of these savings is that a group of citizens making decisions about future public policy could reduce land consumption and road building in their living environment by 20 percent. One-fifth of all roads to be built need not be built. A similar amount of land need not be consumed. These are very significant social accomplishments by any measure.

Further, there are ongoing operating costs for roads and infrastructure that would be reduced if these capital commitments were ultimately reduced. Additionally, by preserving land in the process of development, there is less need to acquire land for parks and recreation as it becomes less plentiful and more costly. Finally, by containing future development around existing development, these areas can be maintained as healthy, tax-paying entities. All of this contributes to lower taxpayer costs in the future.

One of the clearest messages that an analysis of this type can convey is that the various effects of development policies are interrelated. If densities are not increased in the close-in areas to more than compensate for rural area density decreases, regional housing costs will rise. If enormous land savings are garnered as a result of rural large-lot development practices, regional housing costs will also rise.

If too much growth is redirected to existing development areas, regional infrastructure costs will rise. Even though there are environmental consequences of septic systems in rural areas, they remain an inexpensive way to deliver regional sewage disposal services.

The analysis that has been undertaken here has sought to view the potential effects of two different growth scenarios in the Delaware Estuary. The importance of the analysis is severalfold. First, it is an analysis that flows from beginning to end to estimate effects. The initial projections of population and employment, linked with differing standards of land consumption under STATUS QUO or CCMP development alternatives, ultimately determine differences in housing costs and fiscal impacts in the estuary.

Second, the analysis provides a handhold on the orders of magnitude of change that CCMP versus STATUS QUO can introduce, as well as where these two alternative views of development have their most significant impacts. For instance, more significant results of enhanced growth management are going to occur either in locations where there is going to be a great deal of growth (New Jersey communities) or where there hasn't been much previous coordinated land management activities (Delaware communities).

Finally, the analysis can provide some insight into the amounts of natural (land) and cultural (infrastructure) capital that are required to service future development for the foreseeable future. Discussions of adequate land availability can be put into the context of the actual demand for that land. The analysis thus is able to introduce a little more rationality into the debates of managed versus traditional growth in the development of the region.

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