RUTGERS
Edward J. Bloustein School
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Methodology and Software of the Impact Assessment of the New Jersey State Plan

- **Methodological Overview**
- **Software Explanations**
- **Results of the Analyses**

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PREFACE

This report includes information on the procedures used for deriving the basic population and employment projections as well as the five components of the New Jersey State Development and Redevelopment Plan Impact Assessment. These components include the *Economic* Assessment, *Environmental* Assessment, *Infrastructure* Assessment, *Community Life* Assessment, and *Intergovernmental Coordination* Assessment.

The purpose of this report is to provide those that would attempt to replicate this analysis with a programmatic guide to use as a tool to construct such an analysis. Included is a series of linked procedures to assist in reconstructing the analysis. What follows is not meant to be a field-level model to undertake impact assessment generally but rather a guide to the procedures used in a single specific analysis—the 2010 Impact Assessment of the New Jersey State Plan.

It should be realized that the areal basis for all analyses is the individual municipalities of the State of New Jersey. This means that each analysis must be undertaken 566 times for TREND and 566 times for PLAN. Results are then summed to the two halves of the State (North and South); by types of communities (Urban, Inner Suburban, Outer Suburban, and Rural); by Planning Area (Metropolitan, Suburban, Rural, and Environmentally Sensitive); and by communities characterized by center types (Urban, Regional, and Town versus Village, Hamlet, and no center).

The following document explains: (1) the methodology employed in each of the substantive analyses, and (2) the software calculations used to invoke a particular method. The document is organized by the Projection components followed by the Impact Assessment components.

Where possible, an example of the program output is shown. These "screen shots" often contain just a small visual depiction of a part of the overall analysis specific to the analytic section being covered. This usually provides a reasonable glimpse of the type of calculation being done at the particular step. The results of the 2010 Impact Assessment for each area (TREND minus PLAN) are also repeated for each area of the Impact Assessment. This provides some sense of the overall magnitude of the scale of results for a particular section.

Finally, a compact disc (CD) of all programming that leads to the answers contained in the Impact Assessment is included. The files on the CD are readable using Microsoft Excel. This submission will enable those who wish to implement such an analysis to do so. It is the most complete documentation of the State Plan Impact Assessment ever submitted and a valuable tool for practitioners in the field.

POPULATION, HOUSEHOLD, HOUSING UNIT AND EMPLOYMENT PROJECTIONS

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Methodology and Software

INTRODUCTION

Population and household projections reflect the Great Recession. The Great Recession has produced the largest loss of employment that most working-age persons have witnessed in their lifetime. From December 2007 to June of 2009, the United States lost 6.5 million private-sector employees from a base of 138.2 million, or 4.7 percent. It is estimated that nationwide it will take until 2014 to return to the 2000 employment level. New Jersey lost 170,000 private-sector jobs from January 2008 to June 2009. This is from a base of 4.09 million in January 2008, or 4.15 percent. New Jersey may not return to its 2000 job level until 2020.

According to the Harvard University Joint Center for Housing Studies, "Housing demand has withered under the weight of crushing job losses, house price deflation, and tighter credit standards. First-time homebuyers are struggling to meet restricted underwriting guidelines, household growth is well below long-term trends, and immigration has slowed; as a result the share of homes for sale and vacancies stand at near-record levels despite sharp decreases in housing production."[1] With regard to the latter, housing starts are projected nationwide at a level of 500,000 annually for 2009 and 600,000 for 2010. This is 20–30 percent of the 2005 level. Single-family sales nationwide are at 380,000 and 540,000 annually for 2009 and 2010, respectively—29.2/41.5 percent of similar nationwide sales in 2005.

Contrasted with employment, housing-unit trends are not 1-for-1 losses to the household inventory. *Households* are *occupied* housing units. Vacancy in housing units can increase; households can also double up. The above trends, wherein births are growing at a reduced rate, deaths are slightly decreasing due to improved health, immigration is slowing nationally yet impacting specific states more than others (New Jersey), and net outmigration from the Northeast is increasing (especially in New Jersey), contribute to a slowing of population and household growth in the long run. Even though New Jersey has lost jobs in the past, since the Great Depression it has never lost population. This certainly will be true in the future. Population and household growth will continue, and New Jersey will grow at a reduced rate while attempting to recoup some of its job losses.

AN OPENING STATEMENT ABOUT THE PROJECTIONS

It is the opinion of the research group that generated these projections that they are the most accurate of any current available projections because: (1) they all come from the same source (not from multiple MPOs, for instance); (2) they take into account the "Great Recession"; (3) they reflect the latest U.S. Census and Bureau of Labor Statistics data; (4) they incorporate Highlands, Meadowlands, and Pinelands views of current conditions; and (5) they are land-fit using the most current information available on developable land and correcting for errors reported for other sets of projections.

[1] Harvard University Joint Center for Housing Studies, *The State of the Nation's Housing* (Cambridge, MA: Harvard University, July 2009).

POPULATION PROJECTIONS

Projected Population Growth

—

State of New Jersey, 2000–2028

Year (April)	*Population*	*Change from Prior Period*
2000	8,414,350	
2004	8,620,770	
2008	8,682,661	268,311
2013	8,804,367	
2018	8,973,685	
2023	9,185,948	
2028	9,428,438	745,777

Source: 2000-2008 U.S. Census estimates.

Population projections employ all of the latest U.S. Census population estimates, including 2008 municipal numbers released July 1, 2009. This sets the change from 2000 to 2008 for all municipalities. The years 2000 and 2008 are used to establish the growth increment for this period by municipality. The results of this increment form the relative distribution of the projections from 2008 to 2028. The projections at the local level are controlled at the state level by projections of births, deaths, immigration, and net migration (out-migration for New Jersey), which is completed using regression analysis. Regression analysis reaches back into the 1990s (actually to 1993) to project a 20-year future from 2008 to 2028. Population is used to generate households, and households are fed into the land-fit analysis; afterwards, if they don't fit, they are sent to a small reallocation pool and there retallied as households and readjusted to population after the correct population-to-household multipliers are applied.

Each individual municipality is inspected for reasonableness in terms of the scale of the change from 2008 to 2028. Where projections cause severe negative changes that appear unreasonable, they are dampened to bring them within a range of acceptability. The dampening does not affect overall results at the county, regional, or state levels. Any change in one community in a particular direction must be made up by changes in another community in the opposite direction.

The unique aspect of this analysis (in addition to the aforementioned analysis by community for reasonableness) is that the entire community's population is regenerated for the projection date. The population number at the projection date becomes the number from which the original number (at the beginning of the projection period) is subtracted. Changes in the entire community are taken into account. These include demolitions (at a rate of almost 5,000 units annually) for health and safety, transportation, and economic development reasons. Very slight changes in population-to-household ratios over time are allowed to affect the end date such that changes within the community also affect the resultant population/household increment. This is the most accurate way of completing

local population and household projections and, in fact, the preferred way to do such local projections.

HOUSEHOLD PROJECTIONS

Household projections are undertaken using population projections and historical population-to-household ratios. These ratios represent a number that is divided into population to produce households. The numbers are almost equivalent to average household size except that they include a projection of the non-household population within their totals—the population within institutions. As such, population-to-household ratios are somewhat larger than average household size numbers. Population-to-household ratios vary only slightly into the future.

Households are generated from the 2008 and 2028 population counts by applying adjusted population/household ratios at 2008 and 2028. Population-to-household ratios, by community, are adjusted for 2008 and 2028 to develop the total number of households for each period. For 2000, the population-to-housing ratio is 2.7456; for 2004, the population-to-housing ratio is 2.729. Both Global Insight and Woods & Poole calculate population-to-housing ratios at about 2.67 for 2008. From there, Global Insight's ratios move upward slightly over the next twenty years, and Woods and Poole's ratios move downward slightly. The projection undertaken here keeps population-to-household ratios in 2028 at about their 2008 rate. For 2028 (2.68), these ratios are only slightly different from 2008 (2.67), to reflect the different growth rates of the populations at the municipal level. For the most part, however, each community is adjusted by its unique population-to-household ratio as of 2008. Household projections for 2000-2008 are checked against 2000-2008 certificates of occupancy to ensure that they are relatively compatible. Household projections are also checked against a projection of 2000-2008 building permits that is independently obtained. In communities that would receive more projected households than projected housing units, the 2008 and 2028 households are limited to a share (90-95 percent) of the projected units.

Communities that would have severe changes in the number of households have these changes limited in the following ways. Most severely decreasing communities from 2000-2008 have their decrease cut by over one-half; this was is done to allow household growth to parallel housing-unit growth during the period. A few severely decreasing communities from 2008–2028 are limited to a decrease of 2 percent if they issued significant building permits between 2000 and 2008 in contradiction to a population decrease. Most increasing communities from 2008-2028 are not as severely impacted in household change as decreasing communities. They are left basically unaltered under TREND conditions. This is to create an opportunity for PLAN adjustments in a subsequent set of demographic projections.

Population-to-household ratios are projected to remain about the same over the projection period. At the beginning of the period (2008), the ratio is 2.67; at the end of the period, the ratio is 2.68. Reduced in-migration (large numbers of single persons) and increased out-migration (usually families) tend to reduce household size. The baby boom echo household formation and the Great Recession tend to enlarge household size. The first dynamic is related to baby-boom "echo" households having larger families than their

parents; the second relates to the number of individuals and partial families that move in together in difficult economic times.

In the projections used here, population-to-household ratios within most individual communities vary both up and down very slightly; this depends upon the population growth versus household growth for each community of the state. Each community's households are projected based on population change being influenced by current population-to-household ratios. Again, population-to-household size ratios in New Jersey were about 2.75 in 2000 (U.S. Census). These were found to be about 2.668 for 2008 in Global Insight's latest report,[2] and 2.673 in Woods and Poole's latest report.[3]

Households are taken into the future using the above methods and fit to individual communities using vacant land estimates, existing densities, and a redevelopment factor. The amount of vacant land in a community has been reduced by lands inaccurately classified as developable through the GIS analysis. If there is no fit, a small pool of reallocation (<2,600 units) is redirected to communities of similar socioeconomic characteristics in the same portion of the state. Those regions comprise the territory for the reallocation pools. This consists of 8 counties in the northern part of the state, 6 counties in the central part of the state, and 7 counties in the southern part of the state. In the southern and northern parts of the state there were relatively few households in the reallocation pools (<400); in the central portion of the state there were more, but still relatively few households in the reallocation pool (approximately 1,800). This reallocation pool is much smaller than any other pool produced by land-fit analysis of future projections of households or housing units. Accordingly, the projections are more accurate as many fewer households had to be reallocated to other locations because they did not meet the land fit in their own community.

Projected Household Growth

—

State of New Jersey, 2000–2028

Year	*Households*	*Change from Prior Period*
2000	3,064,645	
2004	3,158,797	
2008	3,251,044	186,399
2013	3,293,448	
2018	3,353,564	
2023	3,429,599	
2028	3,516,762	265,718

Source: 2000-2008 U.S. Census Estimates of Population divided by Population and Housing Unit Ratios

[2] Global Insight, Inc., *U.S. Economic Outlook* (May 2009), p. 3.
[3] Woods & Poole Economics, *CEDDS 2008: The Complete Economic and Demographic Data Source,* vol. 1 (Washington, DC: Woods & Poole, September 2008).

HOUSING-UNIT PROJECTIONS

Housing units for 2000, 2004, and 2008 reflect actual U.S. Census data at the county level or local (2000) level. Housing-unit projections are undertaken using household projections, to which are applied vacancy rates unique to each community. In much the same way as the population-to-household ratio change adjusts the municipal base of households, vacancy-rate change is also used to adjust the municipal base of housing units. Again, the projection period end number of total housing units in a community is subtracted from the base number to generate the increment in housing units in that community over the projection period. A housing-unit vacancy rate of 7.5 percent is used for 2000; about 7.6 percent is used for 2008; and 7.0 percent is used for 2028. Housing-unit projections directly follow household projections and differ from these projections only by the standing vacancy rate. Housing-unit projections for the period 2008-2028 reflect the period 2000-2008 and have been checked for reasonableness against population estimates at various points within the 2000-2008 period and, as well, within the 2008-2028 projection period.

Projected Housing-Unit Growth

—

State of New Jersey, 2000–2028

Year	*Housing Units*	*Change from Prior Period*
2000	3,310,275	
2004	3,414,916	
2008	3,517,293	207,018
2013	3,557,696	
2018	3,617,068	
2023	3,693,400	
2028	3,781,464	264,171

Source: 2000-2008 U.S. Census Estimates

EMPLOYMENT PROJECTIONS

Employment projections are also based on the Great Recession impacting the State of New Jersey. This means that in 2009 (3,891,700 jobs), the state had about 103,000 fewer jobs than it did in 2000 (3,994,500). It also means that the state has lost another 64,000 jobs from March 2009 to March 2010. In March 2010, the state has 140,000 *fewer* jobs than it did in March 2000. The state is projected to *gain* several thousand jobs each year from 2011 to 2013. This provides a net loss of 134,000 jobs from 2008 to 2013; an additional gain of 120,000 jobs from 2014 to 2018 (24,000 jobs each year for five years); 105,000 jobs from 2018 to 2023 (21,000 jobs per year during a period encompassing another smaller recession); and 171,000 jobs from 2023 to 2028. This is shown below in tabular form:

Projected Employment Growth
—
State of New Jersey, 2000–2028

Year (December)	*Employment*	*Change from Prior Period*
2000	4,023,900	
2004	4,021,400	(-2,500)
2008	4,000,500	(–20,900)
2013	3,866,500	(–134,000)
2018	3,986,500	+120,000
2023	4,091,500	+105,000
2028	4,262,500	+171,000

Source: 2000-2008 BLS Total Nonfarm Employment

Employment projections at the municipal level are extrapolated into 2008-2028 growth using municipal data from the 1990s and 2000s. Specifically, information was used for the years 1999 and 2008. Other data were collected for the years 1993-1998 and 2003-2006. Data for the year 2000 were never processed for public use. This is also true for data for 2001 and 2002. Data for the year 2000 were obtained by advancing 1999 data for one year. Data for 2008 were obtained as of August 19, 2009 and inserted into the current data file. Employment estimates were controlled by BLS estimates. This involved a 5-10 percent increase in local employment per year to account for suppressed and unlocated employer data at the local level. Community data were also smoothed out where unsubstantiated year-to-year variation was encountered. This was done by using data before and after a particular year to establish the most reasonable number for the interim year.

Employment projections (2008-2028) were controlled at the state level using a series of employment losses or gains based on magnitudes of estimated total job losses and recovery experience of prior decades. The control at the state level was instituted as follows: New Jersey lost 23,400 jobs from 2000 to 2008 (January). It will lose 170,000 jobs during 2008, 2009, and 2010. It will gain 36,000 jobs (12,000 each year) during 2011, 2012, and 2013. The state will lose a net total of 134,000 jobs from 2008 to 2013. It will gain 120,000 jobs from 2013 to 2018 (24,000 jobs/year for five years). The state will gain 105,000 jobs from 2018 to 2023 (21,000 jobs/year for five years); and it will gain 171,000 jobs from 2013 to 2028 (34,200 jobs/year for 5 years). The net gain in jobs from 2008 to 2028 will be +262,000. The gross gain in jobs from 2008 to 2028 (not accounting for losses over the period 2008–2013) is +396,000 jobs (262,000 + 134,000).

The effect of national stimulus efforts or other means of jump-starting employment growth is relatively small thus far because projects are just getting started. The projected stimulus employment increase, much of which is in the construction industry, may slow somewhat a decline of primarily construction employment or even some nonconstruction employment, both of which are already on a pace ahead of projected declines.

REDEVELOPMENT FACTORS

Inner-suburban/urban areas and outer suburban/rural areas were allowed to redevelop according to the following regimen. Approximately 15 percent of urban areas will experience redevelopment during the period 2008-2028. The figure for inner-suburban areas is 11 percent, outer-suburban areas is 9 percent, and rural areas is 7.5 percent. This figure applies only to current residentially developed land, which is a relatively small amount of all land in a community, especially in rural and outer-suburban communities. The redevelopment density increase is 2.0, or twice the existing density. Thus, over a 20-year period, urban areas could experience redevelopment on 15 percent of 70 percent (i.e., 10.5 percent) of their land at a level of about 20 units to the acre. As a result of the above, inner-suburban and urban growth areas, even under TREND conditions, will have their populations and households increased. So too with outer suburban and rural areas, albeit to a smaller overall level.

MEADOWLANDS, HIGHLANDS, AND PINELANDS

Meadowlands, Highlands, and Pinelands jurisdictions have household/housing-unit projections for their inclusive communities. The methodology included here takes these projections into account in this TREND analysis. In other words, for the Highlands there is a mid-range projection that knowledgeable officials believe is analogous to TREND conditions. These were reasonable projections for communities within the Highlands Planning Areas and smaller projections for communities within the Highlands Preservation Areas. While the projections employed here do not exceed these mid-level projections from the various jurisdictions, they may be appreciably lower based on observed trends for the entire state.

The Pinelands Commission also had household projections for various communities. These included more household/housing-unit growth for communities in Pinelands Towns or those Pineland Communities in Regional Growth Areas and less for communities that did not have either such designation. For both the Highlands and the Pinelands, the above trends would be heightened under the PLAN scenario. Less/no development would take place in the Preservation Areas; more/full development would take place in the Planning or Growth Areas.

The Meadowlands Commission has projections for inclusive communities as part of an overall affordable housing study that was undertaken for the area.[4] Again, for communities with significant Meadowlands areas, these projections were taken into account and not exceeded under TREND conditions; as in the other two cases, they may have been substantially reduced. Under PLAN, those communities with more protected areas will receive even less development than they have under TREND.

[4] Community Grants, Planning and Housing (CGP&H). *Regional Housing Needs Assessment*. West Windsor, NJ: CGP&H. July 2009.

LAND AVAILABILITY

There have been comments that the GIS constraint layers do not account for such items as municipally held acreages and municipal parks as undevelopable properties. Also not accounted for in these layers as undevelopable properties are large-lot acreages associated with a developed residential or nonresidential property, median dividers and road intersection acreages, and the rights-of-way acreages of public roads. In order to account for these properties as essentially undeveloped, a constraint on land availability was introduced by type of community. The constraint imposed was as follows: For urban communities, 15 percent of residentially available non-redevelopment land was deemed undevelopable; for inner-suburban communities, 10 percent of residentially available non-redevelopment land was deemed undevelopable; for outer-suburban communities, 12.5 percent of residentially available land was deemed undevelopable; and for rural communities, 7.5 percent of residentially available land was deemed undevelopable.

A CONCLUDING STATEMENT ABOUT PROJECTIONS

Undertaking projections at the local level is a difficult and time-consuming task. Consultants spent the better part of a year to undertake projections for a handful (14) of communities for half of the projection period attempted here.[5] To undertake projections for 566 communities in these very difficult economic times is a daunting challenge. Yet, the projections contained here are well thought-through, reflecting the best and most current information available and the most careful and professional analysis possible. The numbers produced here are reasoned, carefully assembled, and in each case reflect both the history of a very expansive housing market from 2000 to 2005 and, as well, the virtual shutdown of the housing market since that time.

Projections that ignore the most severe recession since the Great Depression are wrong. The "Great Recession" that the state experienced, along with the nation, will impact its future for years to come. Further, to ignore New Jersey's general lack of competitiveness, highlighted by recent trends in the pharmaceutical industry, is also to be insensitive to the future realities of the forces at work in regional markets. New Jersey's middle-class residential markets are migrating to Pennsylvania and, to a lesser degree, Western New York State. New Jersey's blue-chip nonresidential players are migrating to states in the Southeast and Southwest. These are both realities, and they exist without compensating benefits.

[5]Community Grants, Planning and Housing (CGP&H). *Regional Housing Needs Assessment*. West Windsor, NJ: CGP&H. July 2009.

The overriding question that must be answered when projecting population for the state is: Without sufficient immigration, as experienced throughout the 1990s, and counting more accurately by the Census in the year 2000, aren't we back to the 195,000 to 365,000 average population increases of the 1970s and 1980s, respectively? The answer is "Yes!". As such, the population gain for the period 2008 to 2028 has been projected at about 372,900 per decade. Further, how long realistically will it take the state to recover a loss of nearly 200,000 jobs when it rebounded from the 1990s recession with increases of only 12,000–15,000 jobs per year? Could it be a decade or longer until the state regains its 2000 level of employment? Again, the answer is "Yes!". As New Jersey goes forward, it is important to undertake careful analysis and be very realistic about the state's economic future.

The Great Recession has caused those who do national projections to rediscover calculus. We are in a second derivative economy. The rate of increase *in the rate of increase* in the loss of employment is beginning to slow. While this is a positive sign, the United States is a very long way from full recovery. The State must first stop its employment decline (sometime during 2010). It must then make up for the losses incurred (sometime during 2019/2020). It then must go on and grow into the future (2019/2020 to 2028). This scenario will not affect solely the economy of New Jersey, it will affect the economy of every state. "Even though the broad economy shows some signs of stabilizing, employment tends to trail a recovery and is likely to decline for at least several more months albeit at a diminishing rate."[6]

[6] NJ BIZ, "Job Losses High in July, But Pace of Cuts Slows" (August 5, 2009).

ECONOMIC ASSESSMENT

Population, Employment,
Household Income, and Fiscal Impacts
Methodology and Software

ECONOMIC ASSESSMENT

Population Methodology

Population and household projections reflect the Great Recession. The Great Recession produced the largest loss of employment that most of today's working-age population has experienced in their lifetime. From December 2007 to June of 2009, the United States lost 6.5 million private-sector employees from a base of 138.2 million, or 4.7 percent. It is estimated that nationwide it will take until 2018 to return to the employment level of 2000. New Jersey lost 170,000 private-sector jobs from January 2008 to June of 2009. This is from a base of 4.0 million in January 2008, or 4.0 percent. The state lost an additional 23,400 jobs from 2000 to 2008. New Jersey could take until 2020 to return to its 2000 job level.[7]

According to the Harvard University Joint Center for Housing Studies,

> Housing demand has withered under the weight of crushing job losses, house price deflation, and tighter credit standards. First time homebuyers are struggling to meet restricted underwriting guidelines, household growth is well below long-term trends, and immigration has slowed; as a result, the share of homes for sale and vacancies stand at near-record levels despite sharp decreases in housing production.[8]

With regard to decreases in housing production, housing starts are projected nationwide at a level of 500,000 annually for 2009 and 600,000 for 2010. This is 20 to 30 percent of the 2005 level. Single-family sales nationwide are at 380,000 and 540,000 annually for 2009 and 2010, respectively—29.2 and 41.5 percent, respectively, of similar nationwide sales in 2005. Contrasted with employment, housing-unit trends are not 1-for-1 losses to the household inventory. Households are occupied housing units. Vacancy in housing units can increase; households can also double up. The above trends, wherein births are growing at a reduced rate, deaths are slightly decreasing due to improved health, immigration increase is slowing nationally yet impacting specific states much more so than others (New Jersey), and net outmigration from the Northeast is increasing (especially in New Jersey), all contribute to a slowing of population and household growth in the long run. Even though New Jersey has lost jobs in the past, since the Depression it has never lost population. This certainly will also be true in the future. Population and household growth will continue, but slowly, and New Jersey will grow at a reduced rate while attempting to recoup some of its job losses.[9]

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[7] Center for Urban Policy Research, *Impact Assessment of the New Jersey State Development and Redevelopment Plan: TREND Projections*, August 24, 2009.
[8] Harvard University Joint Center for Housing Studies, *The State of the Nation's Housing* (Cambridge, MA: Harvard University, July 2009).
[9] Ibid.

Projected Population Growth

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State of New Jersey, 2000–2028

Year	*Population*	*Change from Prior Period*
2000	8,414,350	
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2008	8,682,661	61,891
2013	8,804,367	121,706
2018	8,973,685	169,319
2023	9,185,948	212,263
2028	9,428,438	242,490
Change (2008-2028):		**745,777**

Source: U.S. Department of Commerce, Bureau of Census, *Population Projections: 2008.* www.census.gov/population/ Disaggregations and refined projections by Center for Urban Policy Research, Rutgers University.

Population projections use all of the latest U.S. Census population estimates, including 2008 municipal numbers released July 1, 2009. This sets the change from 2000 to 2008 for all municipalities. The years 2000 and 2008 are used to establish the growth increment for this period by municipality. This increment forms the gross distribution of the projections from 2008 to 2028. The numbers at the local level are controlled at the state level by projections of births, deaths, immigration, and net migration (outmigration for New Jersey) and completed using regression analysis. Population is used to generate households, and households are fed into the land-fit analysis; afterward, if they don't fit, they are sent to a small reallocation pool and there retallied as households and readjusted to population after the correct population-to-household multipliers are reapplied depending on the location to which they are sent.[10]

Expected Differences between TREND and PLAN

The purpose of the State Plan is to foster population growth in established areas of the state, particularly in central-city and inner-suburban locations. This is in concert with the State Plan's general goal of limiting growth in rural areas. It is anticipated that the TREND and PLAN scenarios will have essentially the same population and household growth at the state and half-state levels (north and south), but significantly different growth by type of community and State Plan planning area. It is also anticipated that under the PLAN regimen there will be more growth in communities with more densely

[10] Center for Urban Policy Research, *Impact Assessment of the New Jersey State Development and Redevelopment Plan: TREND Projections*, August 24, 2009.

developed planning areas and in communities with urban, regional, and/or town/village centers, and that there will be less growth in these areas under the TREND regimen.

Critical Assumptions

Population growth is projected through 2028 using the same formula for the TREND and PLAN scenarios. Population is converted to households using population-to-employment ratios that reflect a steadying of household size over the projection period for all age cohorts. Due to the population-diminishing effects of reduced immigration and increased outmigration, overall population growth will slow over the period.

Scope and Depth of Analysis

Population projections are undertaken for New Jersey's 566 municipalities under TREND conditions, using observed 2000–2008 trends to project a 2028 future. Population is converted to households and then to housing units and allowed to consume land in a community, or comparable (type and income) regionally located communities, until the land is almost exhausted. Projected employment is also simultaneously "fit" within communities. The "developable" land supply in each community is reduced to account for lands likely erroneously classified as developable. After both housing units and employment are assigned, a population change number is determined for the community.

Population and Household (and Employment) Software Calculations and Explanations

A Note on the Parts of the Model

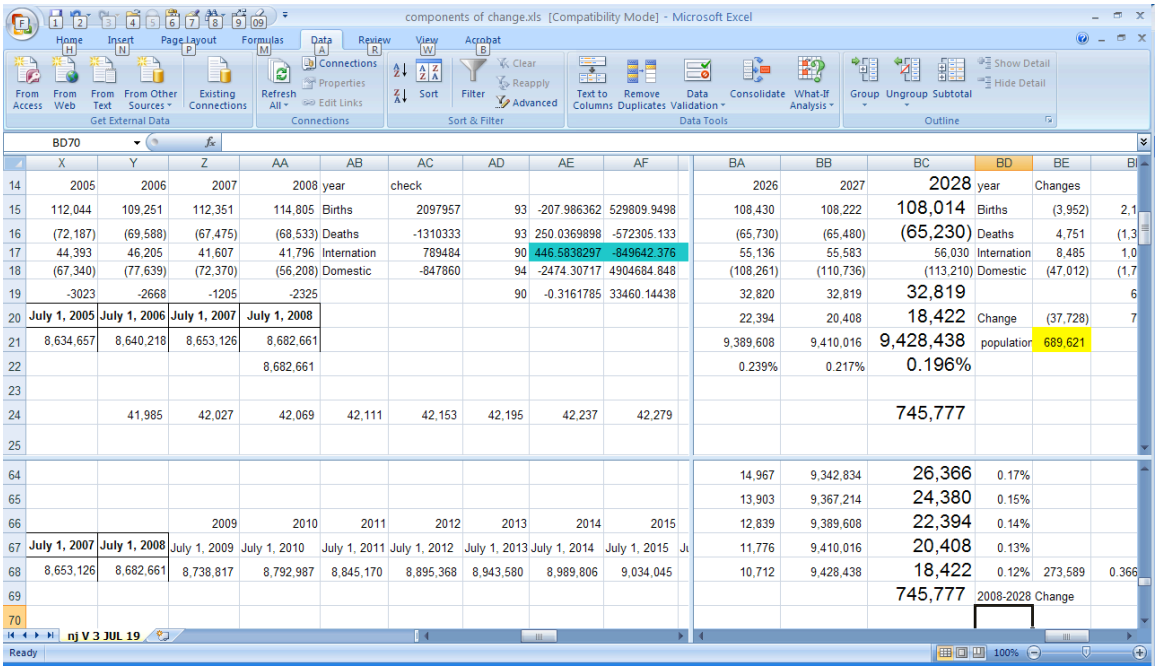
The main model consists of 8 main EXCEL workbooks. They are: 1-emp.xls; 2-Pop.xls; 3-TREND.xls; 4-TREND to PLAN.xls;5-PLAN.xls; 6-display.xls; 7-calc.xls; and 8-tables.xls. There are 7 additional workbooks: components of change.xls, Master USR urban suburban and rural early 08 and later.xls, Land Use Change Analysis by municipality.xls, ROAD.xls, and TRANSIT.xls., cen 2000 inco rent value.xls, and cen 2000 inco rent val for 2008 aff.xls. All of the files should be copied into a folder called state-plan on the main level of the "C" drive (c:\state-plan). If this is not done some of the links will not work.

There are a large number of blank columns in some sheets. Data that was no longer being used in the model was removed in many cases, but columns were not moved. The VLOOKUP function is used frequently in the model, and moving columns without being sure all possible lookups were checked could cause problems.

In its current form the model will work only with the population, household, employment, and housing-unit projections as published in the report. Additional work would have to be done to adjust some programming to accept alternate projections.

TREND Software Calculations and Explanations

The workbook components of change.xls generates the statewide population projection for the end year of the analysis based on trends in births, deaths, international migration and domestic migration for the State of New Jersey. Census components of change information from 1990 to 1999 and 2001 to 2008 (obtained from the Census local population estimates program) were entered into this spreadsheet. Regressions were then performed on the individual components, and the coefficients generated from the regressions were used to project the future level of each component, which were then summed to generate a population projection figure.



Screen shot of part of Population Calculation

The workbook 2-pop.xls starts with generating a 2008 population per household in the sheet "copy of pop-hsl" in Column AA. This is then used in sheet "alt_main" to generate 2008 household distribution by town based on the Census 2008 town population estimates (Column DZ). A final estimate of 2028 households is generated in Column FM and is copied to Column FR.

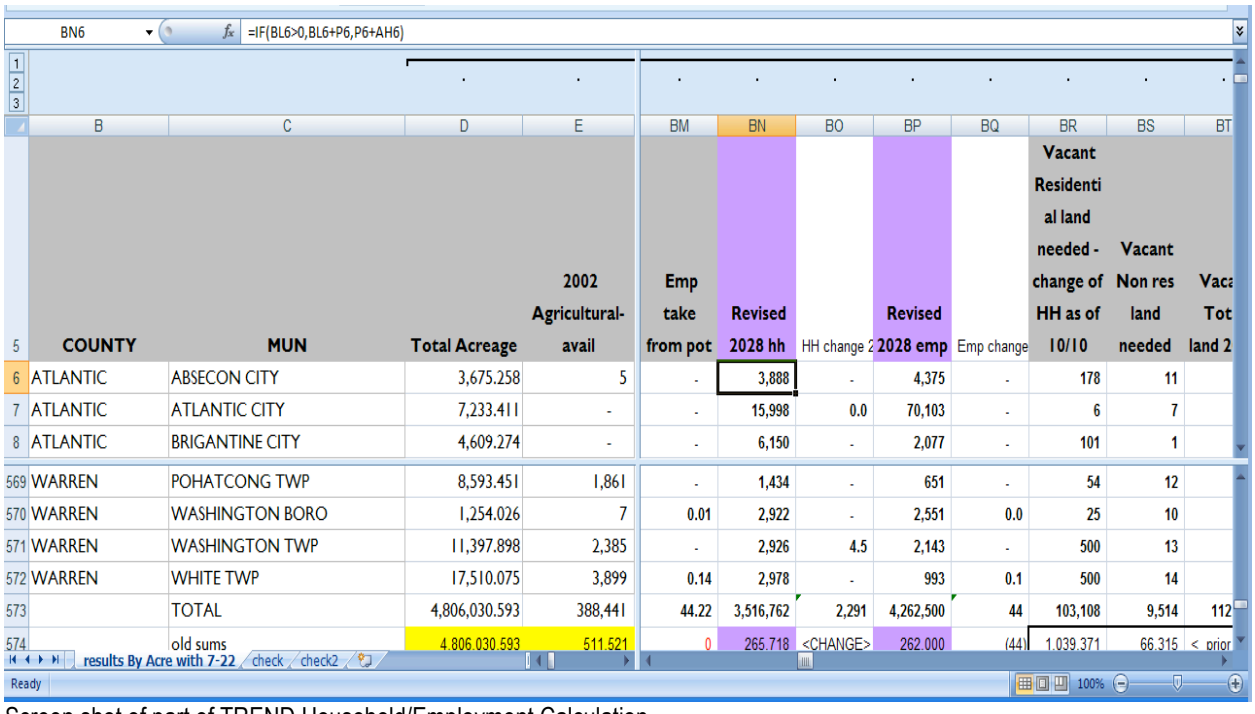
A first estimate of 2028 households is generated in Column FP. That calculation is copied to Column GM and further adjusted by calculations performed for towns with major changes in Columns GO to GU. The result is found in Column GN, which is repeated in Column FR.

Sheet "alt_main", Columns FR and FS are passed on to 3-TREND.xls, sheet "results by acre", Columns CV and CW. The 2028 values are then passed through Pinelands, Highlands, and Meadowlands checks before the final land fit in 3-TREND.xls, sheet "results by acre", which starts in Column P and involves Columns AG, AH, and BL.

These household growth numbers are compared against the available vacant land in each town.

The vacant land (initially 2003 data from GIS measurements) is introduced in 3_TREND.xls in sheet "vacant" Columns A to F. It is then reorganized into a normal code scheme via a lookup and saved into Column L for agricultural vacant land and Column M for forest acres. A factor to control for erroneously calculated land availability (Column O), which depends on town (Urban, Suburban, Rural) type (Column N), is then applied and the final result of total vacant agricultural and forest land is calculated in Column R, which is then passed on to sheet "results by acre", Column EL and then passed on to Column G after being reduced by an estimate of acres consumed 2003 to 2008 (Column EK) to give an estimate of vacant land 2008.

The initial growth in households and employment is converted to acres needed using density information in Columns BB and BC (repeated from N and O) and compared to available land. Towns that need more land than exists, after applying a redevelopment factor (Columns T and U), have the amount of their growth that will not fit totaled into one of six groups (Columns X to AB), which are based on two socioeconomic factors and also region of the state. Towns which have more land than needed have their excess land totaled in the same way. The households and employment which will not fit are then allocated to the towns which have excess need, by similar socioeconomic characteristics and region. The added households and employment appear in Columns BL and BM, and the final TREND 2028 households and employment appear in Columns BN and BP.



Screen shot of part of TREND Household/Employment Calculation

PLAN Software Calculations and Explanations

The worksheet 4-TREND to PLAN.xls organizes selected household and employment information to be passed on to 5-PLAN.xls.

5-PLAN.xls contains information about all the census tracts in the State. Sheet "all", rows 3 to 1972, contains tract-level data for Residentially Developed Acres (Columns F to L) by Planning Area; Housing Units per Acre (Columns U to AA) by Planning Area; Nonresidential Developed Acres (Columns AG to AM) by Planning Area; Net Land Available for Development (Columns AU to AZ) by Planning Area; Estimates of Households by Planning Area (Columns BF to BL) using the Rutgers method to distribute current households to Planning Area (by considering current development by Planning Area and assigning, depending on the existence of the Planning Areas, a large share of current development to PA1 a smaller share to PA2, an even smaller share to PA3, and so on), Residential Center Designation (Columns BP to BV) by Planning Area (using the Rutgers suggested criteria for determining Self-Identified Centers which considers areas with density 100 percent higher than the county average as centers and applies increased densities to development in these centers); an Estimated Distribution of Current Employment to Planning Area (Columns CQ to CW); Estimated Nonresidential Density (Columns DN to DT), Potential Nonresidential Center Locations (Columns DV to EB) (again, based on Rutgers' method of distributing current development to Planning Area, this time based on employment); a combination of residential and nonresidential Center information (Columns FJ to FP); and a summarization area of Center designations which allows for changing an area's designation (Columns FW to GK). Columns HJ to HY were used to distribute information from multi-town tracts to the component municipalities. Columns IA to IG were the base data – net land available for development. These land measurements were later split into residential and nonresidential shares after being reduced by a Rutgers reduction factor to control for the overcount of vacant land that was local parks and similar small undevelopable areas that had not been entered into the various coverages that were utilized to remove undevelopable land. Rows 2000 and on from selected columns were occasionally used in this sheet to tabulate information on the municipality level.

All land area measurements above were done in GIS after removing land that was undevelopable for any reason.

The sheet "CTPP" (Census Transportation Planning Package) provides tract-level employment numbers (2000), the retail component of which was used to test for possible mixed-use tracts.

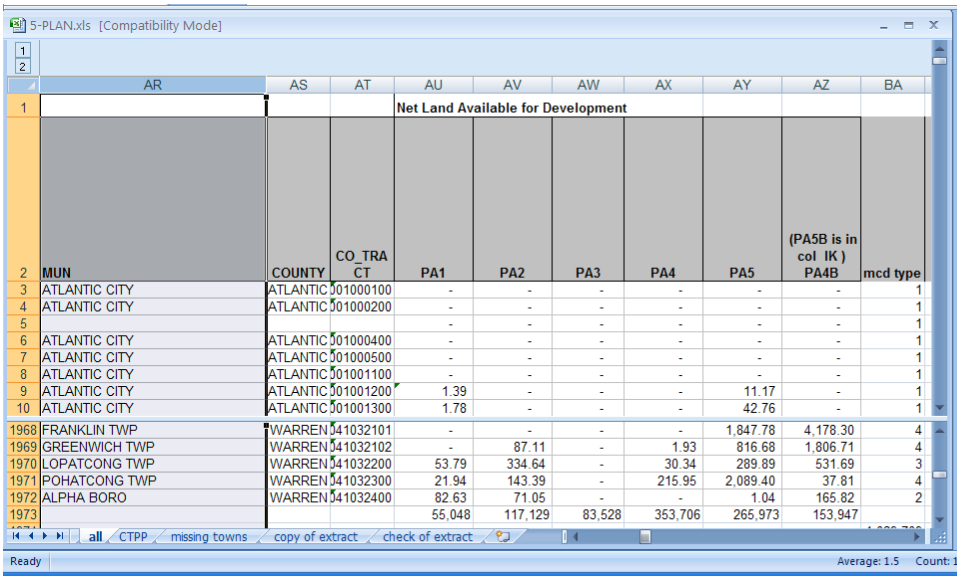
The sheet "new_ctrs" adds some centers that were not self-identified but appeared in prior State Planning material. Centers are added only if they meet certain criteria.

The sheet "den_adjust" has the final programming for distributing the possible growth of PLAN to general areas of the state and coordinating PLAN with TREND, making TREND and PLAN equal at the State and North/South levels.

The "find_land" sheet takes calculations from sheet "den_adjust", Columns BL to BR and CV to DB to develop the amount of land taken by PLAN for each town (Column EB starting in row 2050).

The sheet "extract for display" organizes information to pass on to 6-Display.xls, sheet "numbers from PLAN".

The workbook 6-Display.xls organizes both TREND and PLAN Population, Household, Housing Unit, and Employment information for presentation by municipality within county.



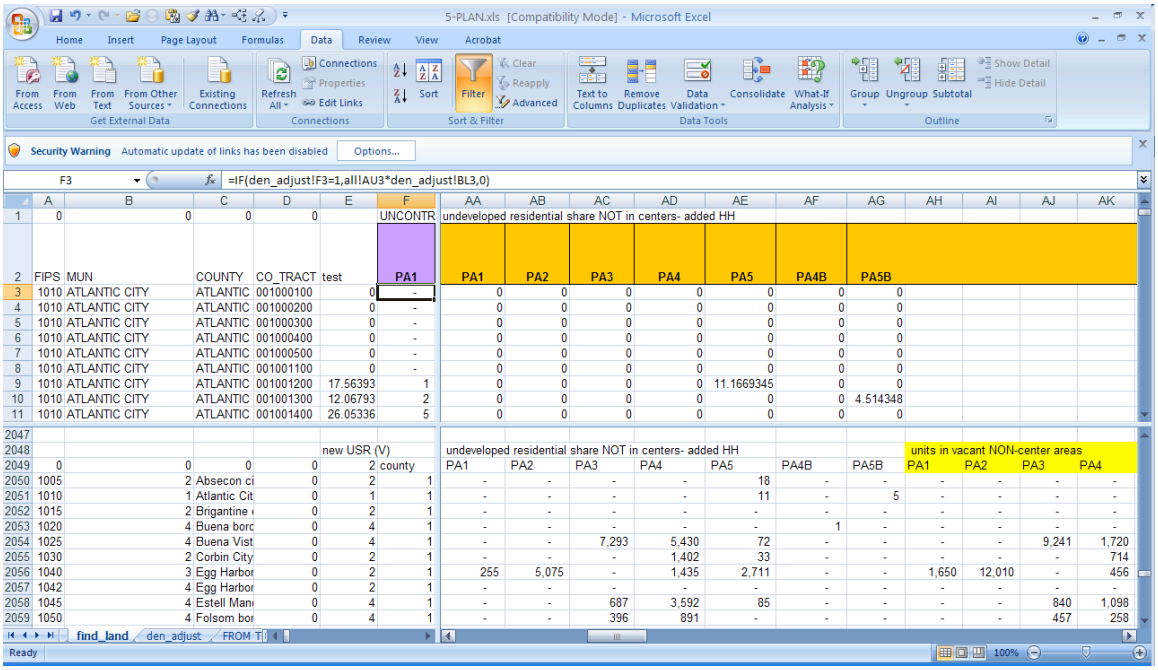
5-PLAN.xls [Compatibility Mode]

	AR	AS	AT	AU	AV	AW	AX	AY	AZ	BA
1				Net Land Available for Development						
2	MUN	COUNTY	CO_TRACT	PA1	PA2	PA3	PA4	PA5	(PA5B is in col IK) PA4B	mcd type
3	ATLANTIC CITY	ATLANTIC	001000100	-	-	-	-	-	-	1
4	ATLANTIC CITY	ATLANTIC	001000200	-	-	-	-	-	-	1
5				-	-	-	-	-	-	1
6	ATLANTIC CITY	ATLANTIC	001000400	-	-	-	-	-	-	1
7	ATLANTIC CITY	ATLANTIC	001000500	-	-	-	-	-	-	1
8	ATLANTIC CITY	ATLANTIC	001001100	-	-	-	-	-	-	1
9	ATLANTIC CITY	ATLANTIC	001001200	1.39	-	-	-	11.17	-	1
10	ATLANTIC CITY	ATLANTIC	001001300	1.78	-	-	-	42.76	-	1
1968	FRANKLIN TWP	WARREN	041032101	-	-	-	-	1,847.78	4,178.30	4
1969	GREENWICH TWP	WARREN	041032102	-	87.11	-	1.93	816.68	1,806.71	4
1970	LOPATCONG TWP	WARREN	041032200	53.79	334.64	-	30.34	289.89	531.69	3
1971	POHATCONG TWP	WARREN	041032300	21.94	143.39	-	215.95	2,089.40	37.81	4
1972	ALPHA BORO	WARREN	041032400	82.63	71.05	-	-	1.04	165.82	2
1973				55,048	117,129	83,528	353,706	265,973	153,947	

all | CTPP | missing towns | copy of extract | check of extract

Ready | Average: 1.5 | Count: 1

Screen shot of part of PLAN Household/Employment Calculation



5-PLAN.xls [Compatibility Mode] - Microsoft Excel

Security Warning Automatic update of links has been disabled Options...

F3 =IF(den_adjust!F3=1,all!AU3*den_adjust!BL3,0)

	A	B	C	D	E	F	AA	AB	AC	AD	AE	AF	AG	AH	AI	AJ	AK
1	0	0	0	0		UNCONTR	undeveloped residential share NOT in centers- added HH										
2	FIPS	MUN	COUNTY	CO_TRACT	test	PA1	PA1	PA2	PA3	PA4	PA5	PA4B	PA5B				
3	1010	ATLANTIC CITY	ATLANTIC	001000100	0	-	0	0	0	0	0	0	0				
4	1010	ATLANTIC CITY	ATLANTIC	001000200	0	-	0	0	0	0	0	0	0				
5	1010	ATLANTIC CITY	ATLANTIC	001000300	0	-	0	0	0	0	0	0	0				
6	1010	ATLANTIC CITY	ATLANTIC	001000400	0	-	0	0	0	0	0	0	0				
7	1010	ATLANTIC CITY	ATLANTIC	001000500	0	-	0	0	0	0	0	0	0				
8	1010	ATLANTIC CITY	ATLANTIC	001001100	0	-	0	0	0	0	0	0	0				
9	1010	ATLANTIC CITY	ATLANTIC	001001200	17.56393	1	0	0	0	0	11.1669345	0	0				
10	1010	ATLANTIC CITY	ATLANTIC	001001300	12.06793	2	0	0	0	0	0	0	4.514348				
11	1010	ATLANTIC CITY	ATLANTIC	001001400	26.05336	5	0	0	0	0	0	0	0				
2047																	
2048					new USR (V)		undeveloped residential share NOT in centers- added HH							units in vacant NON-center areas			
2049	0	0	0	0	2	county	PA1	PA2	PA3	PA4	PA5	PA4B	PA5B	PA1	PA2	PA3	PA4
2050	1005	2	Absecon ci	0	2	1	-	-	-	-	18	-	-	-	-	-	-
2051	1010	1	Atlantic Cit	0	1	1	-	-	-	-	11	-	5	-	-	-	-
2052	1015	2	Brigantine	0	2	1	-	-	-	-	-	-	-	-	-	-	-
2053	1020	4	Buena borc	0	4	1	-	-	-	-	-	1	-	-	-	-	-
2054	1025	4	Buena Vist	0	4	1	-	-	7,293	5,430	72	-	-	-	-	9,241	1,720
2055	1030	2	Corbin City	0	2	1	-	-	-	1,402	33	-	-	-	-	-	714
2056	1040	3	Egg Harbor	0	2	1	255	5,075	-	1,435	2,711	-	-	1,650	12,010	-	456
2057	1042	4	Egg Harbor	0	2	1	-	-	-	-	-	-	-	-	-	-	-
2058	1045	4	Estell Mani	0	4	1	-	-	687	3,592	85	-	-	-	-	840	1,098
2059	1050	4	Folsom bor	0	4	1	-	-	396	891	-	-	-	-	-	457	258

find_land | den_adjust | FROM T

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Screen shot of part of PLAN Household/Employment Calculation

Results of the Analysis

PLAN versus TREND Findings—Population			
	TREND Change 2008-2028	**PLAN Change 2008-2028**	**PLAN Change Minus TREND Change 2008-2028**
New Jersey	745,777	745,777	0
Regions			
North	264,298	264,297	0
South	481,479	481,479	0
Type of Community			
Urban	133,023	181,181	48,158
Inner Suburban	262,124	359,830	97,706
Outer Suburban	263,008	166,427	-96,581
Rural	87,622	38,339	-49,282
Planning Area			
Metro, Suburban, Fringe	560,208	639,897	79,688
Rural, Env. Sensitive	185,569	105,880	-79,689
Centers			
Large Centers (Urban, Regional, Town)	578,599	614,244	35,645
All Others	167,178	131,533	-35,646

Source: Rutgers University, Center for Urban Policy Research, Projections 2008–2028.

Employment Methodology

Employment projections are also based on the Great Recession impacting the State of New Jersey. This means that in 2009 (3,891,700 jobs), the state had about 103,000 fewer jobs than it did in 2000 (3,994,500). It also means that the state has lost another 64,000 jobs from March 2009 to March 2010. In March 2010, the state has 140,000 *fewer* jobs than it did in March 2000. The state is projected to *gain* several thousand jobs each year from 2011 to 2013. This provides a net loss of 134,000 jobs from 2008 to 2013; an additional gain of 120,000 jobs from 2014 to 2018 (24,000 jobs each year for five years); 105,000 jobs from 2018 to 2023 (21,000 jobs per year during a period encompassing another smaller recession); and 171,000 jobs from 2023 to 2028. This is shown below in tabular form:[11]

[11] Center for Urban Policy Research, *Impact Assessment of the New Jersey State Development and Redevelopment Plan: TREND Projections*, August 24, 2009.

Projected Employment Growth

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State of New Jersey, 2000–2028

Year	*Employment*	*Change from Prior Period*
2000	4,023,900	
2004	4,021,400	-2,500
2008	4,000,500	-20,900
2013	3,866,500	-134,000
2018	3,986,500	120,000
2023	4,091,500	105,000
2028	4,262,500	171,000
Change (2008-2028) :		**262,000**

Source: U.S. Department of Labor, Bureau of Labor Statistics, *Total Non-Farm Employment, 2000-2008.* Disaggregations and refined projections by Center for Urban Policy Research, Rutgers University.

Employment projections at the municipal level are extrapolated into 2008 to 2028 growth using municipal data from the 1990s and 2000s. Specifically, information was used for the years 1990 to 1999 and 2003 to 2007.

Employment projections were controlled at the state level by the above totals. Employment projections were individually viewed within a county to control for excessive positive or negative outcomes. If either of these conditions was found within a county, adjustments were made to dampen the extremes. In all cases, negative values had to be dampened more than positive values.

The employment projections were also controlled by county using NJDOL relative distributions of county employment projections to which were applied reduced state change control totals. Thus, the relative positions of the counties were maintained although the increment of change was lessened due to the ongoing recession.

The effect of national stimulus efforts or other means of jump-starting employment growth is relatively small thus far because projects are just getting started. The projected Stimulus employment increase, much of which is in the construction industry, may slow a decline of primarily construction employment or even some nonconstruction employment that is already on a pace ahead of projected declines.

Expected Differences between TREND and PLAN

It is anticipated that there will not be significant differences between TREND and PLAN employment numbers at the state or regional levels. There should be significant differences between TREND and PLAN employment growth by type of community (urban, inner-suburban, outer-suburban, and rural), State Plan planning area (metro, suburban, and fringe versus rural and environmentally sensitive), and State Plan centers (urban, regional, and town centers versus all other locations). If the State Plan is achieving its goals, there should be more employment development under the PLAN scenario in urban versus rural communities; in communities with more densely developed planning areas versus communities with less densely developed areas; and in urban, regional, and/or town centers versus communities without large centers.

Critical Assumptions

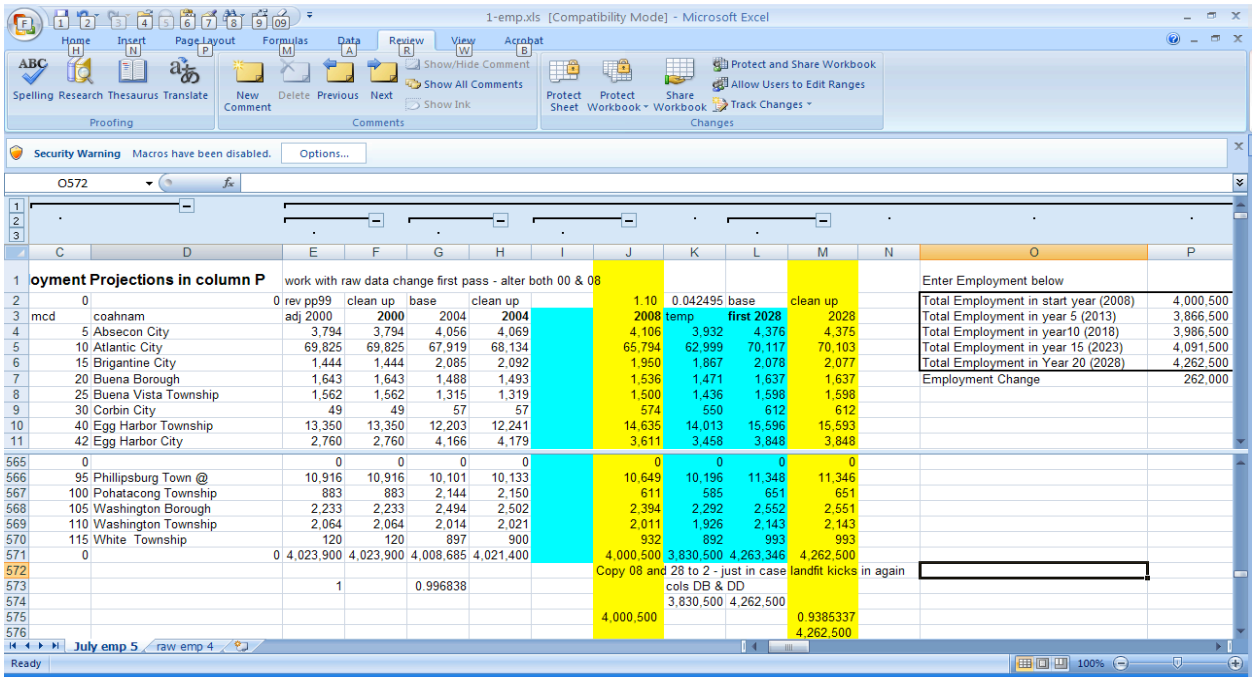
Employment projections for 2008 and 2028 are the same for the TREND and PLAN scenarios at the regional (north and south) and state levels. Under TREND conditions, employment projections at the municipal level are controlled by relative employment distributions at the county level. Under PLAN conditions, municipal employment projections flow from population projections and experience the desired relationships between population and employment growth reflective of the Plan.

Scope and Depth of Analysis

Employment projections are made for each of the state's 566 municipalities under both TREND and PLAN conditions. Projections are completed by allowing households (including vacancy) and employment to consume available land in parallel. Under the TREND and PLAN scenarios, relationships between the existing number of households and the existing or desired number of jobs reserve land for future employment (under the TREND or PLAN regimens, respectively) relative to the projected amount of household growth in each scenario. Employment growth consumes land according to structure space per employee (including vacancy) and relationships of structure space to land space (including a platting coefficient).

Employment Software Calculations and Explanations

The calculations for employment start in 1-emp.xls. sheet "July emp 5", columns E to M. At this point historical employment distributions are adjusted to the 2028 desired employment. The 2008 data and the 2028 first estimate of TREND employment are then passed on to 3-trend.xls, sheet "results by acre", columns DB and DD. At that point the numbers are reorganized to match the ID series of the new sheet. From this point on the TREND employment estimates are paired with the TRENDs household estimates as they are adjusted for Pinelands, Meadowlands, and Highlands, and for general land fit. See the Population/Households calculation section for more information on employment calculations.



Screen shot of part of Employment Calculation

Results of the Analysis

PLAN versus TREND Findings—Employment

	TREND Change 2008-2028	PLAN Change 2008-2028	PLAN Change Minus TREND Change 2008-2028
New Jersey	262,000	262,000	0
Regions			
North	166,805	166,805	0
South	95,195	95,195	0
Type of Community			
Urban	83,541	98,176	14,635
Inner Suburban	130,641	139,245	8,604
Outer Suburban	38,141	19,204	-18,937
Rural	9,677	5,375	-4,302
Planning Area			
Metro, Suburban, Fringe	238,363	244,583	6,220
Rural, Env. Sensitive	23,637	17,417	-6,220
Centers			
Large Centers (Urban, Regional, Town)	218,250	224,508	6,258
All Others	43,750	37,492	-6,258

Source: Rutgers University, Center for Urban Policy Research, Projections 2008–2028.

Household Income Methodology

Household projections are undertaken using population projections and historical population-to-household ratios. These ratios represent a number that is divided into population to produce households. These numbers are almost equivalent to average household size except that they include a projection of the non-household population in their totals. As such, population-to-household ratios are slightly smaller than average household size numbers.

Households are taken into the future using the above methods and fit to individual communities using vacant land estimates, existing densities, and a redevelopment factor. The amount of vacant land in a community has been reduced by lands inaccurately classified as developable through the GIS analysis. If there is no fit, a small pool of reallocation is redirected to communities of similar socioeconomic characteristics in the same portion of the State. This is more often a function of restricted Highlands or Pinelands growth rather than the inability to contain normally projected household growth. In the southern portion of the state there were no households in the reallocation pool; in the northern portion of the state there were fewer than 1,000 households in the reallocation pool. This reallocation pool is much smaller than any other pool produced by land-fit analysis of future projections of households or housing units. Accordingly, the projections are more accurate as many fewer households had to be reallocated to other locations because they did not meet the land fit.

Projected HOUSEHOLD Growth

—

State of New Jersey, 2000–2028

Year	*Households*	*Change from Prior Period*
2000	3,064,645	
2004	3,158,797	94,152
2008	3,251,044	92,247
2013	3,293,448	42,404
2018	3,353,564	60,116
2023	3,429,599	76,034
2028	3,516,762	87,163
Change, 2008-2028:		**265,718**

Source: U.S. Department of Commerce, Bureau of Census, *Population Projections: 2008.* www.census.gov/population/
Disaggregations and refined projections by Center for Urban Policy Research, Rutgers University.

Expected Differences between TREND and PLAN

It is anticipated that, as was the case with population growth, household and household income growth under PLAN will be the same as TREND at the state and regional levels but significantly greater than TREND in urban/inner-suburban communities and in communities that are more densely developed and have urban, regional, or town centers. Greater household and household income growth in these areas will result from PLAN's attraction of households to these locations.

Critical Assumptions

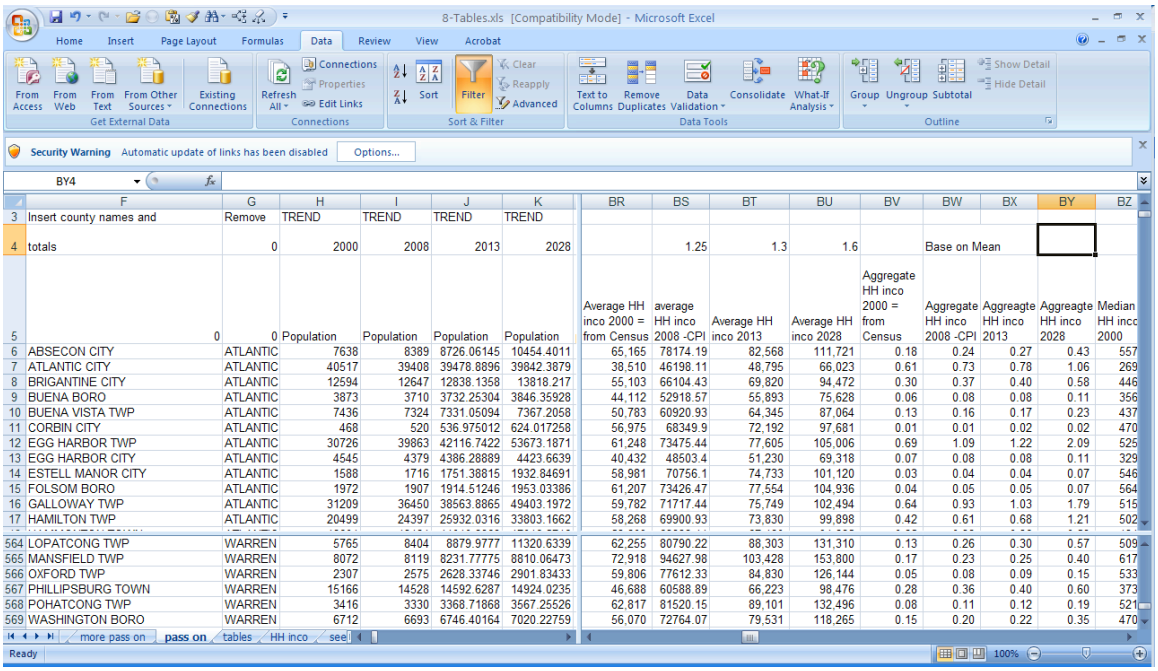
Similar overall demographic and economic forces impact both TREND and PLAN growth. Differences in the location of households and the resultant household income of places are due primarily to the effects of the policies of PLAN. All projections of income are in current dollars.

Scope and Depth of Analysis

Household projections are undertaken for the state's 21 counties and 566 municipalities. Projections are made for a 20-year period using the most current estimates of the relationship between population and households over time. TREND projections reflect the best estimate of historical conditions extended into the future. PLAN projections react specifically to the goals and policies of the PLAN scenario. Information is presented for multiple time periods and multiple geographies for comparison purposes.

Household Income Software Calculations and Explanations

The calculations for Household Income appear in 8-Tables.xls, sheet "pass on" columns BR to BY and columns CI to CL, sheet "HH income: col L, and sheet "tables", rows 195 to 255. The Census 2000 average household income is looked up from the "HH inco" sheet and stored in BR. This value is adjusted for inflation for 2008, 2013, and 2028 in columns BS to BU. These averages are then multiplied by the appropriate count of households and subsequently summarized and transferred into the "tables" sheet for final display.



Screen shot of part of the Household Income Calculation

Results of the Analysis

PLAN versus TREND Findings—Households			
	TREND Change 2008-2028	***PLAN Change 2008-2028***	***PLAN Change Minus TREND Change 2008-2028***
New Jersey	265,718	265,718	0
Regions			
North	90,072	90,072	0
South	175,646	175,646	0
Type of Community			
Urban	38,638	55,916	17,277
Inner Suburban	99,563	135,786	36,223
Outer Suburban	97,800	61,524	-36,275
Rural	29,717	12,491	-17,225
Planning Area			
Metro, Suburban, Fringe	198,933	227,894	28,962
Rural, Env. Sensitive	66,785	37,823	-28,962
Centers			
Large Centers (Urban, Regional, Town)	205,556	217,962	12,405
All Others	60,161	47,756	-12,406
Source: Rutgers University, Center for Urban Policy Research projections.			

PLAN versus TREND Findings—
Household Income (in Current $Billions)

	TREND Change 2008-2028	*PLAN Change 2008-2028*	*PLAN Change Minus TREND Change 2008-2028*
New Jersey	191.27	191.27	0.00
Regions			
North	108.83	108.83	0.00
South	82.44	82.44	0.00
Type of Community			
Urban	39.98	42.00	2.02
Inner Suburban	90.38	96.34	5.96
Outer Suburban	47.38	42.03	-5.35
Rural	13.52	10.90	-2.62
Planning Area			
Metro, Suburban, Fringe	158.14	162.44	4.30
Rural, Env. Sensitive	33.13	28.83	-4.30
Centers			
Large Centers (Urban, Regional, Town)	148.25	150.12	1.87
All Others	43.02	41.15	-1.87

Source: Rutgers University, Center for Urban Policy Research projections.

Equalized Valuation Methodology

Projections of equalized real property value are undertaken using unique values of single-family units (one to four units), apartment units (five units or more), commercial, industrial, and agricultural and vacant land for each community. Not included in the totals are government and other non-taxable properties. The number of single-family and multifamily units is derived from the U.S. Census count of single and multifamily units, together with the Division of Local Government Services estimates of real property value by type of property. This is necessary because the latter source has only parcel information and not unit information for individual properties. For multifamily properties, units cannot be determined from parcel information.

A 2008 base is established by projecting units (residential) and structures (nonresidential) to 2008. However, caution must be exercised when using this estimate. The ongoing recession has severely affected home prices, and the subprime mortgage market downturn has increased the number of foreclosures. The U.S. Department of Housing and Urban Development has estimated that in New Jersey over 69,000 houses are in foreclosure and 4.26 percent of all residential addresses are either vacant for over 90 days or are in

foreclosure. The Center for Responsible Lending estimates that by the end of 2010, in addition to the number of foreclosures, another 1.8 million homes in neighborhoods surrounding foreclosed homes will lose value. This drop will be approximately $19.3 million, or $10,800 per affected home. This unregistered decrease is not included in the overall analysis.[12]

Foreclosure rates vary significantly by county and municipality. The lowest rates are for Morris and Hunterdon counties (with less than a 2 percent foreclosure rate on all mortgages) to the highest rates in Essex and Cumberland counties (rates greater than 6 percent). Every urban county has a rate of greater than 5 percent. A number of New Jersey's mature urban cities (Newark, Camden, Paterson, East Orange, and Irvington) have foreclosure rates above 10 percent. As indicated above, foreclosures have negative impact on the value of nearby homes. The Center for Responsible Lending estimates the average loss in proximate home value per unit in New Jersey is $10,857; this is above any decrease in home value resulting from a weak housing market. The number of homes affected by foreclosures in New Jersey is estimated to be 1,781,424. The impact is particularly strong in Essex and Hudson counties, where almost 5,000 home foreclosures occurred in 2005 and 2006. In those two counties the decrease in house values and tax base as a result of subprime mortgage foreclosures is over $2.8 billion. Accordingly, overall equalized real property value for the State of New Jersey has increased while a number of cities have experienced a decrease in home values.[13]

Expected Differences between TREND and PLAN

TREND and PLAN growth in equalized real property value can vary at the state, regional, and subregional levels. The determining factor is where the growth will take place under each scenario. Given the current distribution of growth under TREND conditions, and the higher level of real property value in developing rural communities, TREND would exhibit somewhat more growth in equalized property value during the period 2008–2028. This expected difference favoring TREND can be altered by the presence, in rural communities, of centers, which might lower values somewhat due to densities and housing types, and/or by the economic resurgences of certain urban communities. Overall, expected differences between the two development scenarios are small due to the number of countervailing forces acting simultaneously.

Critical Assumptions

Net taxable equalized real property value projections by units of property type are compiled using information from U.S. Census estimates and the 2007 Division of Local Government Services' property tax information. It is assumed that the one- to four-unit dwellings in the U.S. Census are situated on the parcels listed as residential in the 2007

[12] United States Department of Housing and Urban Development, HudUser, Neighborhood Stabilization Program, 2009. www.huduser.org/Databases/nsp/nsp_fc_m-n.html, and Center for Responsible Lending, New Jersey Foreclosure – Impact and Opportunities. 2009. www.responsiblelending.org/mortgage-lending/tools-resources/factsheets/nj-fact-sheet.pdf

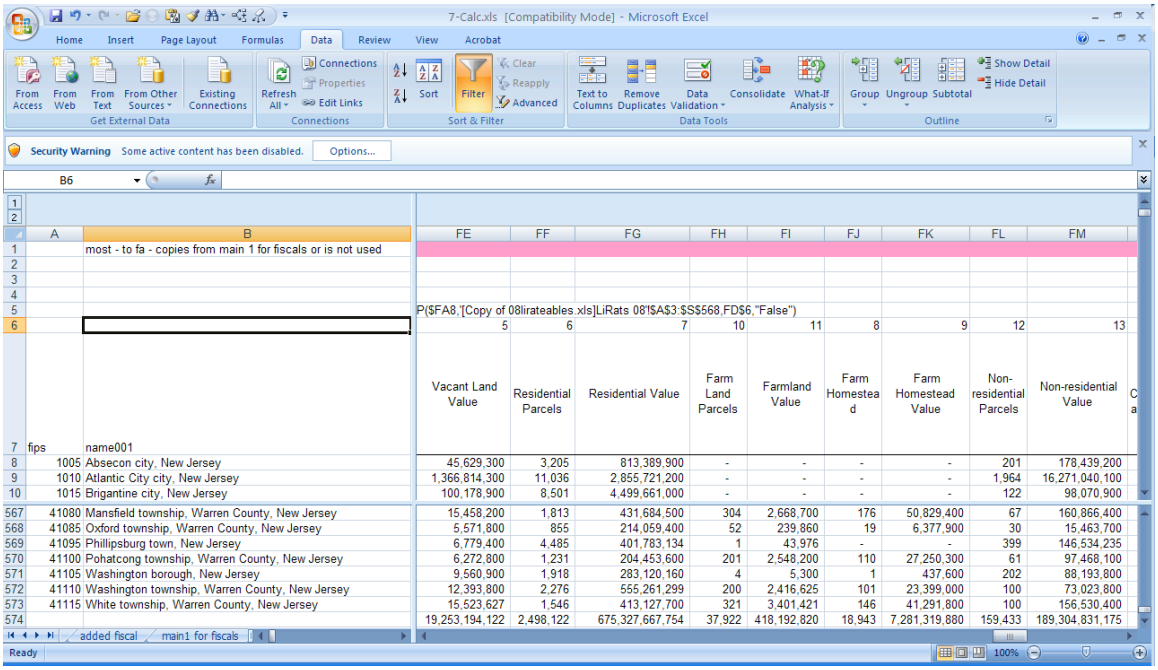
[13] Center for Responsible Lending, New Jersey Foreclosure–Impact and Opportunities. 2009. www.responsiblelending.org/mortgage-lending/tools-resources/factsheets/nj-fact-sheet.pdf.

Division of Local Government Services databases and make up the aggregate net taxable equalized real property value found in this publication. Using this procedure, the number of residential units per parcel calculated is equivalent to about one. It is further assumed that the total of units listed as multifamily (five or more units) in the 2008 U.S. Census estimates constitute the value listed as apartments on the Division of Local Government Services Web site. The number of units in the census divided by the number of apartment parcels is the number of units per parcel of multifamily development.

For nonresidential uses, the aggregate equalized real property value and number of commercial and industrial parcels are linked to employment through multipliers of employees per 1,000 square feet.

Equalized Valuation Software Calculations and Explanations

The calculations for equalized value appear in 7-Calc.xls, sheet main1 for fiscals, columns BZ to CC, and 7-Calc.xls, sheet "added fiscal", columns BZ to CA, CO and CP, CY and CZ, and 8-tables.xls, sheet "pass on" columns HC to HU (where an 80 percent inflation factor for the 20-year period is applied), and columns CI to CL, as well as sheet "tables", rows 259 to 319.



Screen shot of part of the Equalized Valuation Calculation

Results of the Analysis

PLAN versus TREND Findings—
Household Equalized Real Property Value
(in Current $Millions)

	TREND Change 2008-2028	*PLAN Change 2008-2028*	*PLAN Change Minus TREND Change 2008-2028*
New Jersey	1,275,417	1,275,417	0
Regions			
North	733,221	733,221	0
South	542,196	542,196	0
Type of Community			
Urban	245,384	256,910	11,526
Inner Suburban	656,653	695,214	38,561
Outer Suburban	291,527	257,744	-33,784
Rural	81,853	65,550	-16,303
Planning Area			
Metro, Suburban, Fringe	1,027,700	1,053,420	25,719
Rural, Env. Sensitive	247,717	221,998	-25,719
Centers			
Large Centers (Urban, Regional, Town)	989,574	1,001,049	11,474
All Others	285,843	274,369	-11,474

Source: Rutgers University, Center for Urban Policy Research projections.

Fiscal Impacts Methodology

An analysis of the fiscal impacts of public-service provision involves three basic steps: the calculation of (1) costs, (2) revenues, and (3) net fiscal impact. This is done for the primary local service providers (municipalities, school districts, and counties) using their information on basic fiscal indices.

Municipal, School District, and County Costs

In order to calculate future per capita local costs, information on expenditures is taken from municipal and county budgets summarized in the New Jersey Department of Community Affairs, Division of Local Government Services, Property Tax Information (2008—the most current year available for non-valuation data). This information is available for all 566 municipalities and is reported as expenditures for municipal, school, and county functions plus capital improvements, debt service, and deferred charges. The annual expenditure for municipal and county services is then divided between services rendered to local residences and businesses, using information on the distribution of land parcel value and numbers among residences (single-family and apartments) and businesses (commercial and industrial). The percentage value and parcel distribution for

residential properties are averaged and applied to the expenditures for municipal and county services and divided by the existing population to derive noneducational expenses incurred by residents. This is the first component of future per capita local costs. As a subset of this procedure, the remaining portion of municipal and county costs is divided by the existing amount of "at-place" employment, and the results are expressed as the cost per employee.[14]

An abbreviated procedure is used to determine the second component of future per capita local costs. An additional cost per capita is developed by dividing school expenditures (both local and regional) reported by the Division of Local Government Services by the existing resident population, as determined specifically for this impact assessment.

The third component of future per capita local costs is county costs paid by the municipality and also reported by the Division of Local Government Services. This value is also divided by the local resident population determined for the impact assessment.

The next step is to translate the three components of future per capita local costs into future aggregate local costs, including school expenditures. The three residential components of per capita costs are summed and multiplied by the number of future residents expected from residential development. The remaining component, municipal and county costs per employee, is multiplied by the number of workers from future nonresidential development. These are in the form of future local employment projections. Future local public costs are the sum of per capita local public costs (municipal, school district, and county) multiplied by the new increment of residents and the sum of per-worker local public costs (municipal and county), multiplied by the new increment of workers. This calculation is performed for the full growth increment in each municipality under each development scenario.

Municipal, School District, and County Revenues

Revenues for the municipality, school district (both local and regional), and county are calculated as follows. The values of residential and nonresidential property are individually multiplied by the combined municipal, school district, and county components of the total equalized real property tax (as reported by the Division of Local Government Services) to determine local property tax revenues. Property tax revenues are then supplemented by other revenues as follows. Nontax local revenues are expressed per capita and projected into the future relative to the increment of population. Intergovernmental transfers are expressed per existing $1,000 of equalized real property value and also projected into the future relative to the increment of real property value that the future development represents. Total municipal, school district, and county revenues are the sum of property tax, nontax, and intergovernmental transfer revenues. The property tax share of all revenues is also obtained from information reported by the Division of Local Government Services.

[14] New Jersey Department of Community Affairs (2009).

Net Fiscal Impact

Net fiscal impact is the subtraction of total local public costs from total local public revenues (municipality, school district, and county). It involves separate calculations for residential and nonresidential development, even though the overall fiscal impact is the result of the summation of the two individual impacts. The difference between total local revenues and total local costs for the municipality is the net fiscal impact of the increment of development on the municipality. This difference is summed for the 566 municipalities for each development scenario, and the differences in the summed values represent the differences in fiscal impact occasioned by the TREND and PLAN alternative futures.

Expected Differences between TREND and PLAN

At the state and regional levels, there is no way to predict the relationship between expected development and future fiscal impacts. On one hand, the analysis controls for essentially equivalent population and employment growth at the state and regional levels. On the other hand, this growth in households and employment will be distributed very differently in terms of its location within regions of the state. This will also affect resulting fiscal impacts. The State Plan encourages the growth of significant numbers of households and jobs in the more developed urban and inner-suburban communities of the state. These communities usually have both higher public-service costs and public-service revenues per capita. This is true due to higher property-tax rates in these areas. Thus, one would expect higher public-service costs and possibly even higher tax-generated revenues under PLAN conditions. Since the TREND development scenario and the PLAN development scenario each contain significant amounts of highly valued residential and nonresidential development as a component of future growth, the likelihood is that both future growth scenarios will produce a somewhat positive fiscal impact. Although actual conditions will vary considerably, it is anticipated that moderate positive differences in net fiscal impact will be observed at the state and regional levels under PLAN conditions, but a variety of differences in fiscal impact will be observed below the regional level.

Critical Assumptions

The most critical assumption in the analysis of the fiscal effects of land development is that costs and revenues are initially balanced on both sides of the cost–revenue equation. In most budgets, at the outset, costs must equal revenues. This principle enters into the calculation of the local real property tax rate. The real property tax rate, when applied to the tax base, closes the gap between future anticipated expenditures and all other revenues.

Another critical assumption is the full charging of each new resident, worker, and schoolchild. All residents, workers, and schoolchildren new to a community are fully charged at their current rates under both the TREND scenario and the PLAN scenario. (They are charged at the site and under fiscal circumstances pertaining to that locale.) A final assumption is that all fiscal comparisons take place under financial indices reflective

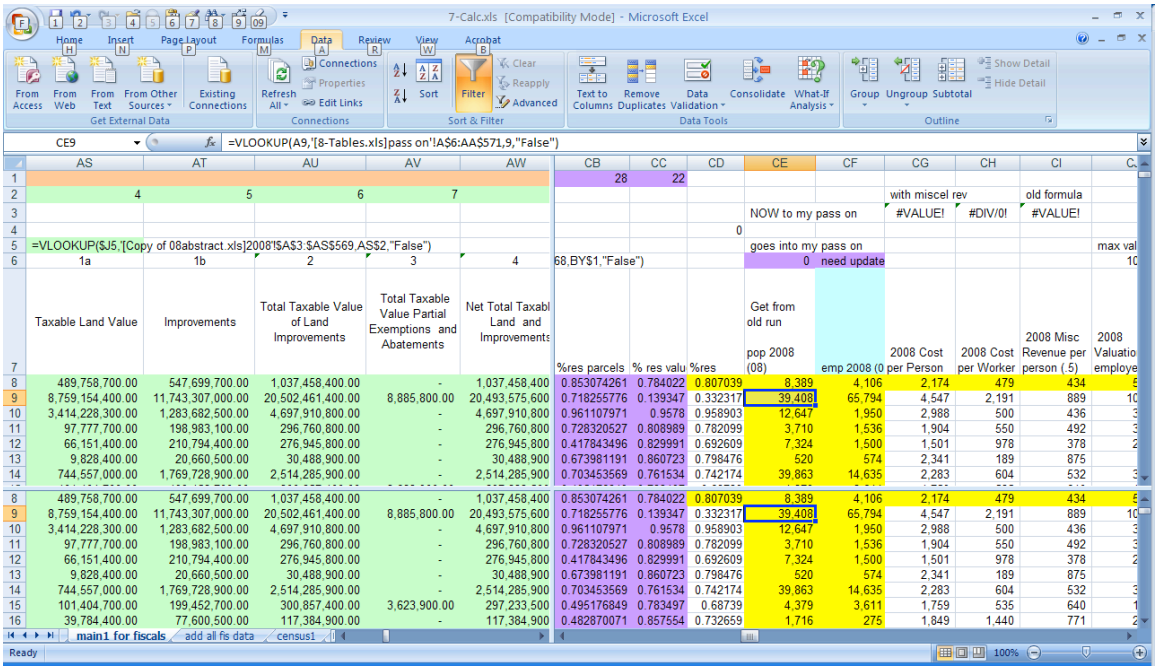
of current conditions. Thus, expenditures, tax rates, and most other fiscal variables enter the financial projections under today's conditions. This assumption acknowledges that there are no changes in the forces that impact the local service sector, and inflation on both sides of the equation is equal.

Scope and Depth of Analysis

A fiscal impact analysis is undertaken for the growth that is impacting each of the 566 municipalities under both TREND and PLAN development scenarios. Fiscal impact analysis includes all municipal, school district, and county costs and revenues that local governments will occasion. This analysis further acknowledges all of the regional school district relationships of which the municipality is a part. The analysis also takes into account full operating, debt service, and capital costs on the cost side of the equation, and the array of tax, nontax, and intergovernmental transfer revenues on the revenue side of the equation.

Fiscal Impact Software Calculations and Explanations

The calculations for Fiscal Impact appear in 7-calc.xls, especially sheets "main1 for fiscals" (where the 2008 data from the DCA, Division of Local Government Services, was entered), "main2 for fiscals", "add all fis data", and "added fiscal" and in 8-tables.xls sheet "pass on" columns FS to GD, as well as in sheet "tables" rows 322 to 423. The "main1 for fiscals" sheet pulls together the final cost, revenue, and fiscal calculations, some of which are performed in sheet "main2 for fiscals", where the estimated cost per person and cost per employee (for each town) for 2028 under TREND and under PLAN sheet "main1 for fiscals" (Columns CL to DE) are calculated or copied.



Screen shot of part of the Fiscal Impact Analysis

Results of the Analysis

PLAN versus TREND Findings—Fiscal Impacts (in Current $Millions)			
	PLAN Costs Minus TREND Costs 2028	***PLAN Revenues Minus TREND Revenues***	***PLAN Net Fiscal Impact Minus TREND Net Fiscal Impact***
New Jersey	-72	45	116
Regions			
North	68	67	-1
South	-139	-22	117
Type of Community			
Urban	216	261	45
Inner Suburban	419	609	189
Outer Suburban	-488	-560	-71
Rural	-218	-265	-46
Planning Area			
Metro, Suburban, Fringe	297	484	186
Rural, Env. Sensitive	-369	-439	-70
Centers			
Large Centers (Urban, Regional, Town)	99	229	130
All Others	-171	-184	-14

Source: Rutgers University, Center for Urban Policy Research projections.

ENVIRONMENTAL ASSESSMENT

—

Land Conversion, Agricultural, and Environmentally Fragile Methodology and Software

ENVIRONMENTAL ASSESSMENT

Land Conversion Methodology

Household projections within each municipality for the period 2008–2028 are divided by area-specific overall occupancy rates to obtain gross housing-unit projections that are then allocated by housing type within each community. Under TREND development, growth projections for municipalities flow from historically based information. Residential growth is allocated to a municipality according to historic development densities as determined by GIS land coverages and Census information, wherein the number of units in a residential area is divided by the amount of land these units occupy. Employment growth is also allocated to communities based on historic growth and development densities.

Under PLAN development, growth in a municipality takes place by first determining whether there are naturally formed centers in a community. These are locations that have 100 percent greater density than the average density of the county. Once this determination is made, development is allocated to remaining developable areas in the community. Centers are naturally existing concentrations of households or jobs, or both, that relate reasonably well to proposed and identified centers and other areas that are like centers in character. Remaining developable areas are areas outside center boundaries—areas within a municipality, developed at densities lower than centers, but nonetheless permitting some level of development. To convert residential structures to the demand for raw land, observed densities of centers in specific planning areas are used. Densities are available for centers of various types (table 1). Densities are also available for remaining developable areas. Very little development takes place in the remaining developable areas—densities are relatively low. Reasonably significant development takes place in redevelopment areas—densities are relatively high. All calculations of density take into account additional land required for roads, street hardware, utilities, and open space. This amounts to an additional land requirement of 15 to 20 percent.

Land Conversion for Nonresidential Structures

Employment growth is translated to the demand for nonresidential land through the use of historic employment densities. Although nonresidential structures are calculated and used elsewhere in this analysis, they are not used directly in the calculation of nonresidential land conversion. Historic employment densities (employees per acre under TREND development) or desired relationships between residential and nonresidential development and center employment densities (PLAN) determine the land consumed by employment housed in a particular community.

In this analysis for both residential and nonresidential development, land converted uses historic development densities for TREND development. It uses calculated center and remaining areas' densities for PLAN development. The latter is historic densities in a community. The primary differences between TREND and PLAN development are the densities for residential development and PLAN's differing employment density in

nonresidential or mixed-use centers. In this analysis, the term "nonresidential unit" is used. As indicated in the section on employment impacts, this is the amount of space required to house future employment growth in units of 1,000 square feet. It is determined from industry standards of employment occupancy but is not used directly in the land conversion calculation.

Development occurs under TREND conditions according to historical projections of households and employment for a 20-year projection future. Thus, TREND development is a detailed extraction of past growth to portray future levels and locations of growth. This flows directly from the population, household, and employment projections found in the economic portion of this impact assessment.

Standards for Centers: PLAN

	Urban	*Town*	*Regional Center PA-1, PA-2*	*Regional Center PA-3, PA-4, and PA-5*	*Village*	*Hamlet*
Area (in square miles)		<2	1 to 10	1 to 10	<1	10 to 50 acres (c.w.) <100 acres (no c.w.)
Population (#)	>40,000	1,000 to 10,000	>10,000	>5,000	<4,500	25-250
Gross Population Density (persons per square mile)	>7,500	>5,000	5,000	5,000	5,000	3,000
Housing (dwelling units)		500 to 4,000	4,000 to 15,000	2,000 to 15,000	75 to 2,000	10 to 100
Gross Housing Density (dwelling units per acre)		>3	>3	>3	>3	>2
Employment (# of jobs)	>40,000	500 to 10,000	>10,000	>5,000	50 to 1,000	
Jobs:Housing Ratio	>1:1	1:1 to 4:1	2:1 to 5:1	2:1 to 5:1	0.5:1 to 2:1	

Notes: c.w. = community wastewater

Criteria are intended to be applied flexibly. Density criteria are relevant primarily to new centers and to the growth areas of existing centers, and are less relevant to the built-up portions of existing centers. Designation criteria refer to the center's planning horizon year (e.g., 2020 population rather than current population).

Source: New Jersey State Planning Commission: *The New Jersey State Development and Redevelopment Plan: Draft Final Plan,* March 29, 2000.

Expected Differences between TREND and PLAN

Land conversion to support an equivalent number of households and jobs at the state and regional levels should be less under the PLAN scenario than under the TREND scenario. This is true because under PLAN development, growth is directed to communities with more densely developed planning areas and to communities with urban, regional, and/or town centers. This is also true because PLAN development prescribes a greater amount of redevelopment than the TREND scenario does. This characteristic of PLAN development—consuming less land than the TREND scenario—should be visible at both the state and regional levels, and even more obvious at the local level. In the latter case, very significant differences should be apparent in rural/outer-suburban municipalities, in communities with less densely developed planning areas, and in communities without urban, regional, and/or town centers.

Critical Assumptions

TREND residential densities are determined by GIS coverages; nonresidential densities are determined similarly, with the exception that under PLAN development, nonresidential and mixed-use centers exist. These centers take housing-unit and employment-structure growth before development in the rest of the community.

Development under PLAN conditions occurs according to two individual factors. The first step under PLAN development is to allocate a component of future growth to centers. The model allocates growth to centers within a community. The State Plan Policy Map has created a series of five planning areas and six categories of centers where development can take place at different scales. Centers are naturally forming areas, the density of which is 100 percent greater than the surrounding county. The number of centers relates to the number of density concentrations; the scale of the center relates to the scale of the naturally forming area. The various planning areas receive growth in relation to the number and scale of centers. Both planning areas and centers are graduated from locations of the most densely developed (metropolitan planning area or PA-1) and the largest centers (urban, regional, and town) to the least developed (environmentally sensitive planning area or PA-5) and the smallest centers (village, hamlet). The concept behind the establishment of these differing development-receptive locations is that development will generally take place in the more densely developed locations PA-1 to PA-3 versus PA-4 and PA-5. Yet development is permitted in all planning areas in centers. Centers of varying types are found in most planning areas; however, the more densely developed planning areas contain the largest number of significant-sized centers. Thus, the State Plan envisions more urban and regional centers in PA-1 and PA-2 and more village and hamlet centers in PA-4 and PA-5. This would provide more overall growth to the former and less overall growth to the latter.

Each of the various types of centers has cores and surrounding community development areas defined by a center boundary. The concept is that the cores will have most of the public and private nonresidential services and the community development areas will contain the bulk of the residential development. Each center has defined limits of

geographical scale as well as development standards associated with residential and nonresidential development.

The second step of the process under PLAN development is to allocate development to the remaining developable areas. Remaining developable areas are areas outside center boundaries that can accept residual development at normal local densities. Remaining developable areas exist only in PA-2 to PA-5. In PA-1, remaining developable areas' density is replaced with redevelopment areas that allow for development in excess of the density that would occur under TREND conditions. Remaining developable areas' density varies by planning area from 0.75 unit per acre in PA-2 to 0.1 unit per acre in PA-5 for the purposes of this analysis.

The remaining developable areas encompass a diversity of conditions, and they vary in form and function throughout New Jersey. In some parts of the state, the remaining developable areas are predominantly infill or skipped-over development. In other parts of the state, the remaining developable areas already have limited development, such as scattered housing, retail, office space, or warehousing. In some counties, the remaining developable areas are already quite developed with a variety of low-density uses, such as larger-lot housing and private educational facilities. In the highway corridors, the remaining developable areas may even include highway-oriented facilities such as rest stops and large warehousing and distribution centers. The policy objectives for PA-3 to PA-5 call for the protection of the PA-2 remaining developable areas from development occurring in centers. Here, remaining developable areas should be primarily open land and form large contiguous areas of undisturbed lands or farmland.

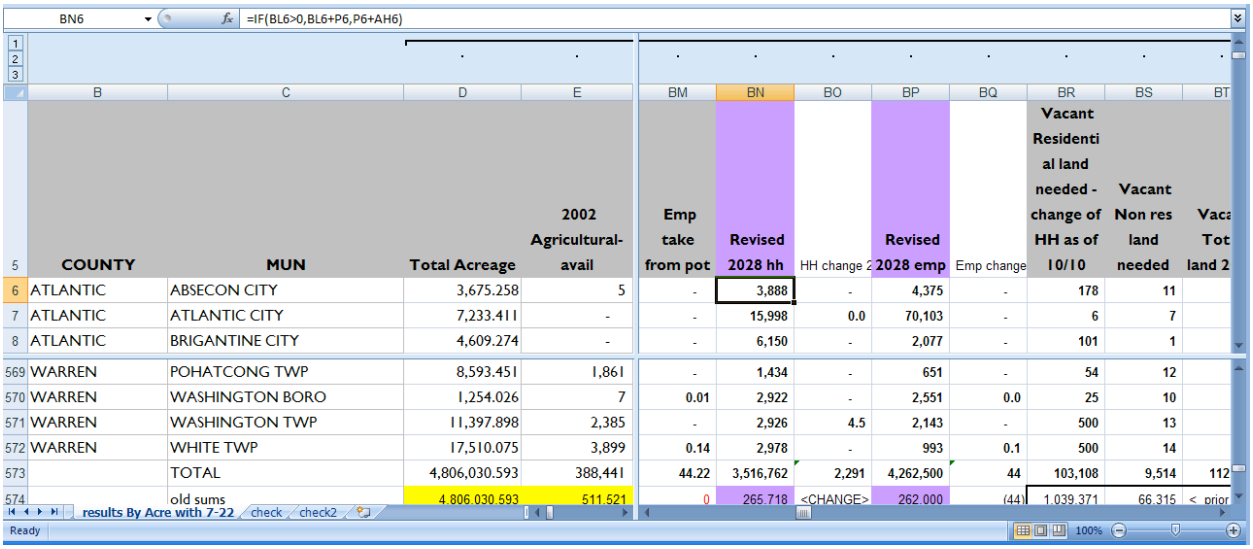
Scope and Depth of Analysis

The analysis of comparative land conversion under TREND and PLAN conditions involves different levels of residential and nonresidential development being projected for each scenario for the state's 566 communities. Each community has a TREND density for residential and nonresidential development; each community has a composite residential and nonresidential density under the PLAN scenario according to the number and types of centers that are contained within the communities.

It should be understood that in some communities across the state, under PLAN development, development proceeds as if it were TREND development. These are communities without naturally formed centers. Thus, in this impact assessment, subscription to the PLAN in every community is not assumed.

Land Consumption Software Calculations and Explanations

The calculations for land consumption appear in 6-display.xls, sheet "pass on", columns AG and AH, with the trend data coming from 3-trend.xls, sheet "results by Acre", column BT and PLAN coming from 5-PLAN.xls, sheet "find_land", Column EB. The final display of the values is in 8-tables.xls rows 508 to 546.



Screen Shot of Part of the Land Consumption Calculations

Results of the Analysis

PLAN versus TREND Findings—
Residential and Nonresidential Development Units

	TREND Change 2008-2028	*PLAN Change 2008-2028*	*PLAN Change Minus TREND Change 2008-2028*
New Jersey	402,066	402,066	-1
Regions			
North	164,624	164,624	0
South	237,442	237,442	0
Type of Community			
Urban	68,238	94,960	26,722
Inner Suburban	173,437	217,301	43,864
Outer Suburban	126,196	76,304	-49,892
Rural	34,194	13,500	-20,694
Planning Area			
Metro, Suburban, Fringe	326,443	360,038	33,595
Rural, Env. Sensitive	75,624	42,028	-33,596
Centers			
Large Centers (Urban, Regional, Town)	318,201	334,908	16,707
All Others	83,865	67,157	-16,708

Source: Rutgers University, Center for Urban Policy Research projections.

PLAN versus TREND Findings— Undeveloped Land Converted (in Acres)			
	TREND Change 2008-2028	***PLAN Change 2008-2028***	***PLAN Change Minus TREND Change 2008-2028***
New Jersey	112,622	52,315	-60,307
Regions			
North	39,925	18,984	-20,942
South	72,697	33,332	-39,365
Type of Community			
Urban	5,981	2,596	-3,385
Inner Suburban	35,890	23,007	-12,883
Outer Suburban	43,464	15,623	-27,841
Rural	27,287	11,090	-16,198
Planning Area			
Metro, Suburban, Fringe	67,730	35,212	-32,518
Rural, Env. Sensitive	44,892	17,103	-27,789
Centers			
Large Centers (Urban, Regional, Town)	75,065	34,671	-40,394
All Others	37,557	17,644	-19,913

Source: Rutgers University, Center for Urban Policy Research projections.

Agriculture Methodology

Expected Differences between TREND and PLAN

TREND conditions in all planning areas show conversion of agricultural lands in equal measure with other types of developable land and at suburban and exurban prevailing densities. PLAN predicts that agricultural land will be converted at the prevailing density levels of centers. PLAN therefore predicts that less agricultural land will be converted to urban use given expected population growth. The analysis includes a projection of the demand for residential and nonresidential development from 2008–2028.

Critical Assumptions

Farmland will be lost under both TREND and PLAN development scenarios. Under the TREND scenario, farmland is converted at historical development densities. Under the PLAN scenario, farmland is actively protected in the fringe (PA-3), rural (PA-4), and environmentally fragile (PA-5) planning areas. This is achieved primarily by guiding growth to centers in PA-3 to PA-5 and limiting development in the exurban and rural

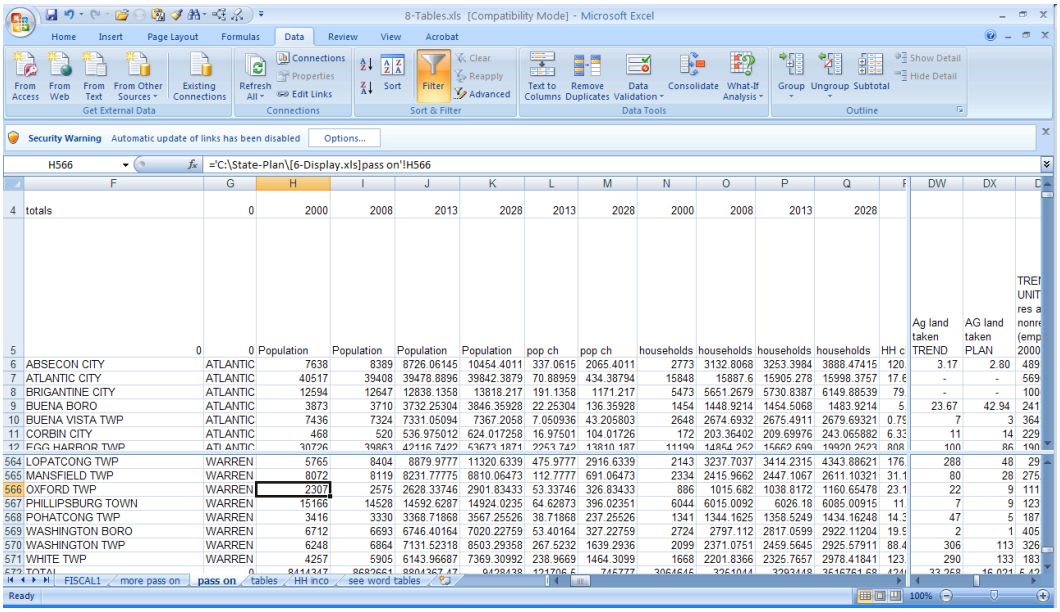
areas of PA-4 and PA-5. In the fringe planning areas (PA-3), development is favored and conflicts between center growth and agricultural land preservation are more frequently decided in favor of growth. In the rural planning areas (PA-4), development is directed to centers, and much of the undeveloped land is retained as agricultural as priority is given to farmland preservation. In the environmentally sensitive planning areas (PA-5), agricultural uses are considered of secondary importance if they conflict with preservation of environmentally fragile land. Of the three planning areas, retention of prime agricultural land and agricultural uses is given the greatest priority in the rural planning area (PA-4), where most prime agricultural land is located.

Scope and Depth of Analysis

Very little agricultural acreage is found in metropolitan planning areas (PA-1) and suburban planning areas (PA-2). Agricultural lands found in the fringe planning areas (PA-3) are not often considered prime. Agricultural lands found in the rural–environmentally sensitive planning areas (PA-4B), while of considerable environmental significance, are classified as agricultural rather than environmentally sensitive. Although the most significant difference in agricultural land conversion under the TREND and PLAN scenarios is in PA-4, agricultural land conversion occurs in other planning areas as well.

Agricultural Land Consumption Software Calculations and Explanations

The calculations for agricultural land consumption work off total land consumption as noted above, with added calculations in 8-tables, sheet "pass on, columns DW and DX, with the final results in sheet "tables", Rows 550 to 609. Sheet "pass on", Column BL, is also used in the calculation.



Screen shot of part of Agricultural Land Calculation

Results of the Analysis

PLAN versus TREND Findings— Agricultural Lands Converted (in Acres)			
	TREND Change 2008-2028	**PLAN Change 2008-2028**	**PLAN Change Minus TREND Change 2008-2028**
New Jersey	33,258	16,021	-17,237
Regions			
North	11,734	5,588	-6,145
South	21,524	10,433	-11,091
Type of Community			
Urban	841	437	-405
Inner Suburban	8,292	6,048	-2,244
Outer Suburban	10,718	3,742	-6,976
Rural	13,406	5,794	-7,612
Planning Area			
Metro, Suburban, Fringe	16,099	8,828	-7,270
Rural, Env. Sensitive	17,159	7,193	-9,966
Centers			
Large Centers (Urban, Regional, Town)	19,608	10,440	-9,168
All Others	13,650	5,581	-8,069

Source: Rutgers University, Center for Urban Policy Research projections.

Environmentally Fragile Land Methodology

In order to calculate environmentally fragile lands lost, lands in PA-5 and PA5B converted for development purposes under the two growth scenarios are compared. PA-5 is the environmentally sensitive planning area; PA-5B is the environmentally sensitive/barrier island planning area. The environmentally sensitive planning area (PA-5) located in the northern half of the state contains the vulnerable steep slopes and scenic vistas of Morris, Somerset, and Passaic counties. In the extreme southern half of the state, in Cumberland and Salem counties, environmentally sensitive lands in the form of coastal wetlands are being protected in PA-5. Finally, again in the northern part of the state, PA-5 areas in Hunterdon, Warren, and Sussex counties are being protected to retain undeveloped prime forested areas and mature stands of plant species. PA-5B, located in the southern part of the state in Monmouth, Ocean, Atlantic, and Cape May counties, provides necessary protection for barrier islands, beaches, and coastal spits. In order to compare the alternative futures, each community will have household and job growth that it must accommodate under TREND or PLAN conditions. Household projections produce a demand for dwelling units that require development acreage according to prevailing residential densities. Employment projections produce a demand for nonresi-

dential structures that require development acreage according to prevailing nonresidential densities. Under TREND and PLAN conditions, land is drawn from developable land that is either nonagricultural, agricultural, or environmentally fragile. None of these lands are protected by wetlands legislation, floodplains or coastal regulations, and so on. Those protected lands cannot be claimed for development.

TREND growth claims unprotected environmentally fragile land equal to its percentage incidence locally. The PLAN scenario claims unprotected environmentally fragile land according to the following schedule. First, for the share of PLAN development that occurs outside centers, its percentage incidence is converted as all land is converted. Second, for the share of development that occurs as center development, environmentally fragile land is converted according to the number of centers and their development densities that occur in PA-5 and PA-5B.

Expected Differences between TREND and PLAN

It is expected that the environmental objectives of the PLAN growth alternative will save some environmentally fragile lands. The specific provision in the State Plan relating to the conservation of environmentally fragile lands is as follows: Protect and preserve large, contiguous tracts and corridors of recreation, forest, or other open space land that encompasses natural systems and sensitive natural resources including endangered species, ground and surface water resources, wetland systems, natural landscapes of exceptional value, critical slope areas, and other significant environmentally sensitive features.

Critical Assumptions

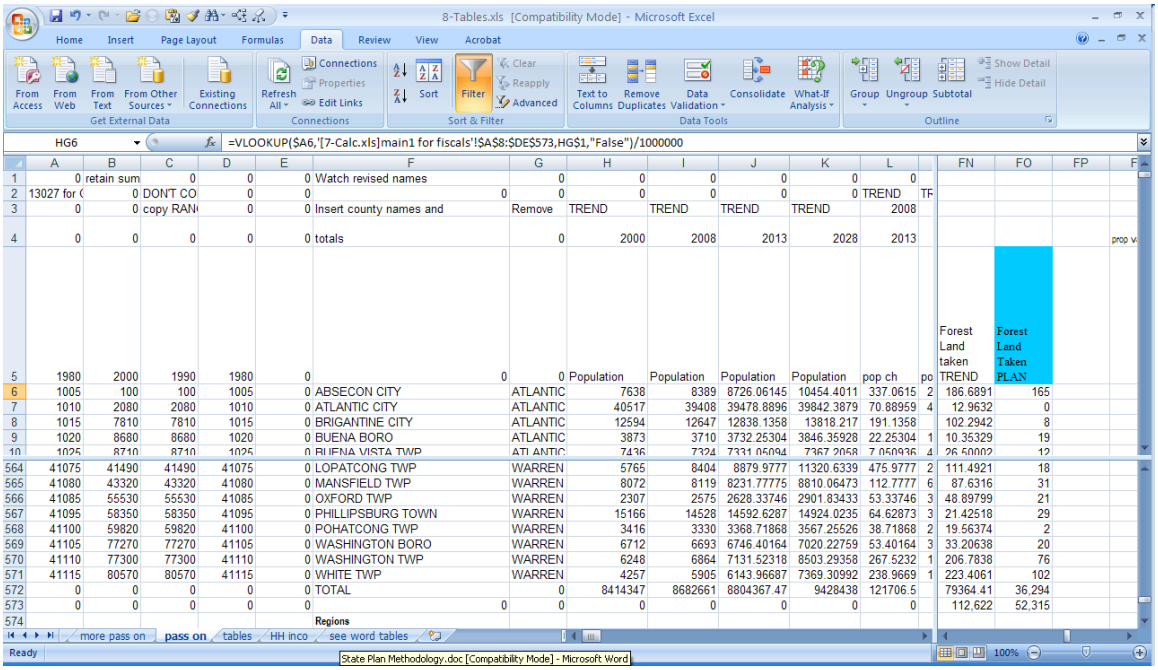
The density of remaining areas in PA-5 and PA-5B under the State Plan is sufficiently low (one unit per 10 acres) that lands used for development as opposed to occupied by development may diminish the overall land savings associated with PLAN development. Environmentally fragile lands are counted as lost (consumed) only if these lands are required for development and are designated as PA-5 or PA-5B lands unprotected by federal, state, and most local regulations. One unit on 10 acres under PLAN consumes 10 acres for development, even though only one acre (or less) is occupied by the structure. In this case, land used for development is 10 acres; land occupied by development is one acre.

Scope and Depth of Analysis

All of the residential and nonresidential development units can consume environmentally fragile land according to where growth is taking place (in a municipality) and the amount of environmentally fragile land that exists in that location (from Landsat).

Environmentally Fragile Land Consumption Software Calculations and Explanations

The calculations for environmentally sensitive (forest) land consumption work off the total land consumption as noted above, with added calculations in 8-tables, sheet "pass on, columns FN and FO, with the final results in sheet "tables", Rows 613 to 672. The calculation also uses sheet "pass on", Column BL.



Screen shot of part of Environmentally Fragile Land Calculation

Results of the Analysis

PLAN versus TREND Findings— Environmentally Fragile Lands Converted (in Acres)			
	TREND Change 2008-2028	**PLAN Change 2008-2028**	**PLAN Change Minus TREND Change 2008-2028**
New Jersey	79,364	36,294	-43,070
Regions			
North	28,192	13,395	-14,796
South	51,173	22,899	-28,274
Type of Community			
Urban	5,140	2,160	-2,980
Inner Suburban	27,598	16,958	-10,639
Outer Suburban	32,745	11,880	-20,865
Rural	13,882	5,296	-8,586
Planning Area			
Metro, Suburban, Fringe	51,631	26,384	-25,248
Rural, Env. Sensitive	27,733	9,910	-17,823
Centers			
Large Centers (Urban, Regional, Town)	55,457	24,231	-31,226
All Others	23,908	12,063	-11,845

Source: Rutgers University, Center for Urban Policy Research projections.

INFRASTRUCTURE ASSESSMENT

Roads, Transit, and
Water and Sewer
Methodology and Software

Roads Methodology

The 2009 analysis of road infrastructure for both TREND and PLAN alternatives follows the earlier methodology found in the 2000 and 1992 assessments. There is no realistic way of doing a full-blown network model for New Jersey that moves from future projections of trips generated through distribution to assignment. At this time, traffic modeling in New Jersey is split among regions, with differing approaches and modeling packages. There also is the issue of scale. The projections of population and households to 2028 are at the municipal level, making the municipality the unit of analysis for model construction.

Expected Differences between TREND and PLAN

The CUPR ROAD Model used in this analysis asserts that there is a connection between population density and the provision of road infrastructure. Furthermore, the model focuses on those roadway elements provided by municipal and county governments in support of development. As communities grow, local and collector streets are constructed. These roads support access to residential, commercial and industrial development. Population density has been found to be an excellent surrogate for the pressures of development and the need for local roads. The relationship between population density and road infrastructure is nonlinear and generally supports the concept of the efficiency of infill development over residential and commercial construction in empty fields.

If population goes predominantly to outer-suburban and rural communities under TREND, given a lack of roads in these locations, more roads will have to be built. If population goes more to urban and inner-suburban communities under PLAN, given a surplus of roads in these locations, fewer roads will have to be built.

The CUPR ROAD Model employed in this study was developed in 2005. The local road data used to construct the ROAD model were taken from the 2003 Streets USA files provided by ESRI. This dataset represents the New Jersey road system as of 2000, making it comparable to 2000 census information. Visual inspection of aerial photographs with both the local road files available from New Jersey Department of Transportation (NJDOT) and the Streets USA files showed that Streets USA was slightly more complete. There was a small set of new suburban developments in Streets USA that did not appear in the NJDOT database. The Streets USA database is an enhancement of the federally supported TIGER network, contains appropriate roadway identifiers, and paints an excellent picture of road infrastructure in New Jersey. Using GIS, local road links were identified and separated from the state and federal systems. The lengths of the road segments were measured and summed by municipality. The calculation was based on centerline road length, ignoring the number of lanes in the roadway. While the presence of state and federal highways, such as Route 18 and Route 1 in central New Jersey, is broadly connected to population geography and size, these roadways are not specifically local decisions. These highways are regional in scale and effect, planned and

constructed by the New Jersey Department of Transportation (NJDOT) to serve broad multi-county needs.

The ROAD model operates at the municipal level, keyed to the population projections developed for TREND and PLAN. The general model is both simple and robust—street length density is predicted by population density. Also, the relationship is nonlinear, suggesting interesting policy implications. A number of alternative statistical models have been tested, but remarkably, the model structure discussed below and used in earlier State Plan impact studies is found to be the most appropriate.

Critical Assumptions

The ROAD model consists of four submodels, each of which is designed for a different set of New Jersey municipalities. The Base submodel operates on the bulk (490) of New Jersey's 566 municipalities. As shown in figure 1 below, fully 80 percent of municipalities have population densities of 5,000 per square mile or less. Only 13 have densities exceeding 15,000 persons per square mile. These very dense cities require a separate model design—the Dense City submodel.

FIGURE 1. Population Density Groupings, New Jersey Municipalities, 2008

	Frequency	*Percentage*	*Valid Percentage*	*Cumulative Percentage*
5,000 or less	457	80.7	80.7	80.7
5,000 to 10,000	76	13.4	13.4	94.2
10,000 to 15,000	20	3.5	3.5	97.7
Over 15,000	13	2.3	2.3	100.0
Total	566	100.0	100.0	—

New Jersey is also characterized by an extensive shoreline and a host of summer communities that have a large seasonal population. These "seasonal communities" have road systems built to support summer traffic, but have small year-round populations. Some of these are in the process of conversion from occasional to year-round occupancy, such as Egg Harbor Township, yet still reflect road systems that are overbuilt for populations counted by Census as year-round. For the purposes of this study, these recreational communities are defined as those with more than 10 percent of housing units classified as in occasional use as of Census 2000. They range from Harvey Cedars with 81 percent occasional use to Spring Lake Heights, Dover Township in Ocean County, and Vernon at 11 percent. Some of these municipalities are converting from recreational to full-time but still have embedded infrastructure from the earlier periods. The relationships between population and street density are different from the majority of New Jersey communities. These seasonal communities have an abundance of roads relative to their year-round populations and require a separate analytic approach—the Seasonal Community Submodel (figure 2).

FIGURE 2. Seasonal Communities Occasional-Use Dwelling Units, New Jersey Municipalities, 2008					
		Frequency	*Percentage*	*Valid Percentage*	*Cumulative Percentage*
Valid	10 percent or less	505	89.2	89.2	89.2
	More than 10 percent	61	10.8	10.8	100.0
	Total	566	100.0	100.0	

Finally, there are five municipalities in New Jersey with less than 100 housing units. These are excluded from the model due to their size. Their road infrastructure is calculated using a ratio technique. The five municipalities are shown below (figure 3).

FIGURE 3. Small Municipalities, New Jersey: Total Households, 2008		
Municipality	*County*	*Households*
Rockleigh Boro	Bergen	80
Teterboro Boro	Bergen	8
Pine Valley Boro	Camden	21
Tavistock Boro	Camden	7
Walpack Twp	Sussex	34

To summarize, four different modeling approaches are used to project 2028 road needs. The four models are:

- ***Base Submodel***—The 490 municipalities with over 100 households that have population densities less than 15,000 persons per square mile and are not classified as seasonal.
- ***Dense City Submodel***—The 13 municipalities with population densities in excess of 15,000 persons per square mile
- ***Seasonal Community Submodel***—The 58 municipalities that have a significant number of dwelling units that are occupied seasonally.
- ***Small Community Submodel***—The five extremely small towns with less than 100 households require a straightforward ratio approach.

Base Submodel

Given a power function analysis of municipalities that have a population density of 15,000 or less, are not a "recreational community," and are not extremely small, there is a strong fit of the power function. The statistical fit is very strong with an R-square of .88 (or 88 percent explained variation) (figures 4 and 5). The power function is estimated at:

Local Road Density = .305 * Population Density .457

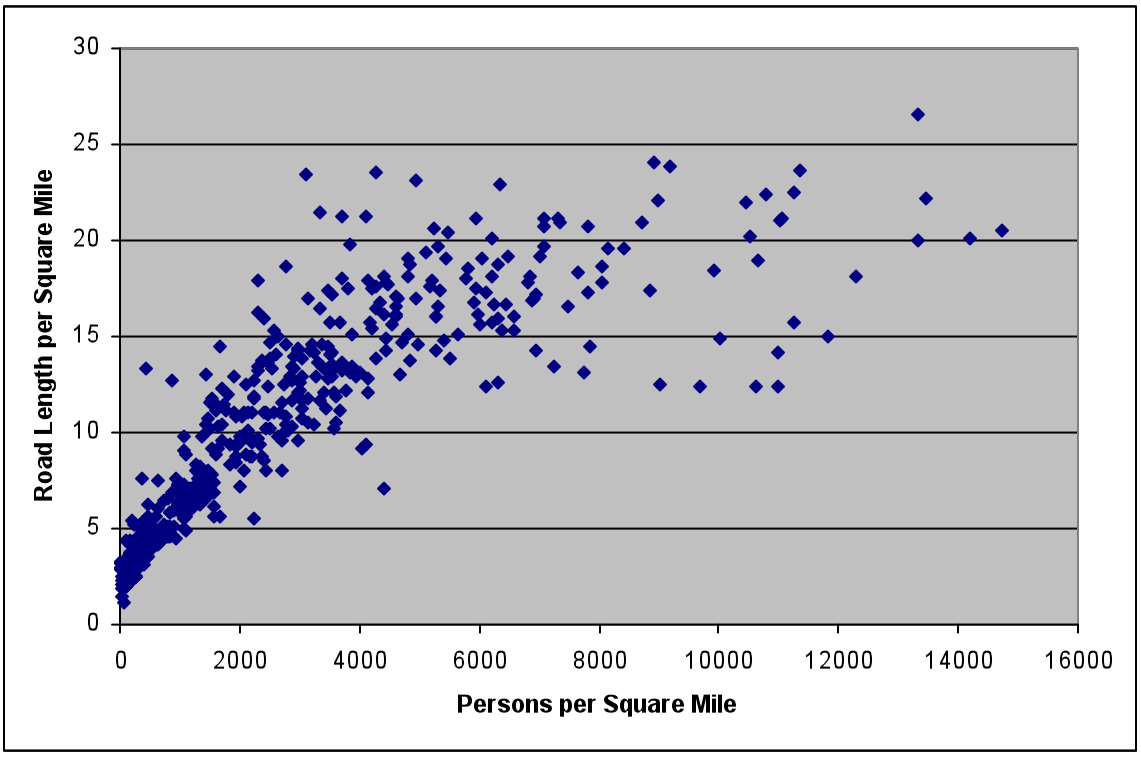
FIGURE 4. Base Submodel Statistics
— Model Summary and Parameter Estimates —

Dependent Variable: Road Density

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	Constant	b1
Power	.880	3563.078	1	488	.000	.305	.457

Note: The independent variable is population density in 2008.

FIGURE 5. Road Density versus Population Density — Base Submodel



Dense City Submodel

For the higher-density municipalities (N = 13), the pattern is generally the same as for the base municipalities. The 13 communities are listed below. They are typically older, containing heavily urban concentrations and development patterns featuring dense road systems.

FIGURE 6. Thirteen Higher-Density Communities			
		Municipality	County
1		CLIFFSIDE PARK BORO	BERGEN
2		FAIRVIEW BORO	BERGEN
3		EAST ORANGE CITY	ESSEX
4		IRVINGTON TWP	ESSEX
5		EAST NEWARK BORO	HUDSON
6		GUTTENBERG TOWN	HUDSON
7		HOBOKEN CITY	HUDSON
8		JERSEY CITY	HUDSON
9		UNION CITY	HUDSON
10		WEEHAWKEN TWP	HUDSON
11		WEST NEW YORK TOWN	HUDSON
12		PASSAIC CITY	PASSAIC
13		PATERSON CITY	PASSAIC
Total	N =	13	13

The relationship is nonlinear; the power function shows an R-square of 73 percent, which is quite strong (figures 7 and 8):

Local Road Density = .436 * Population Density $^{.391}$

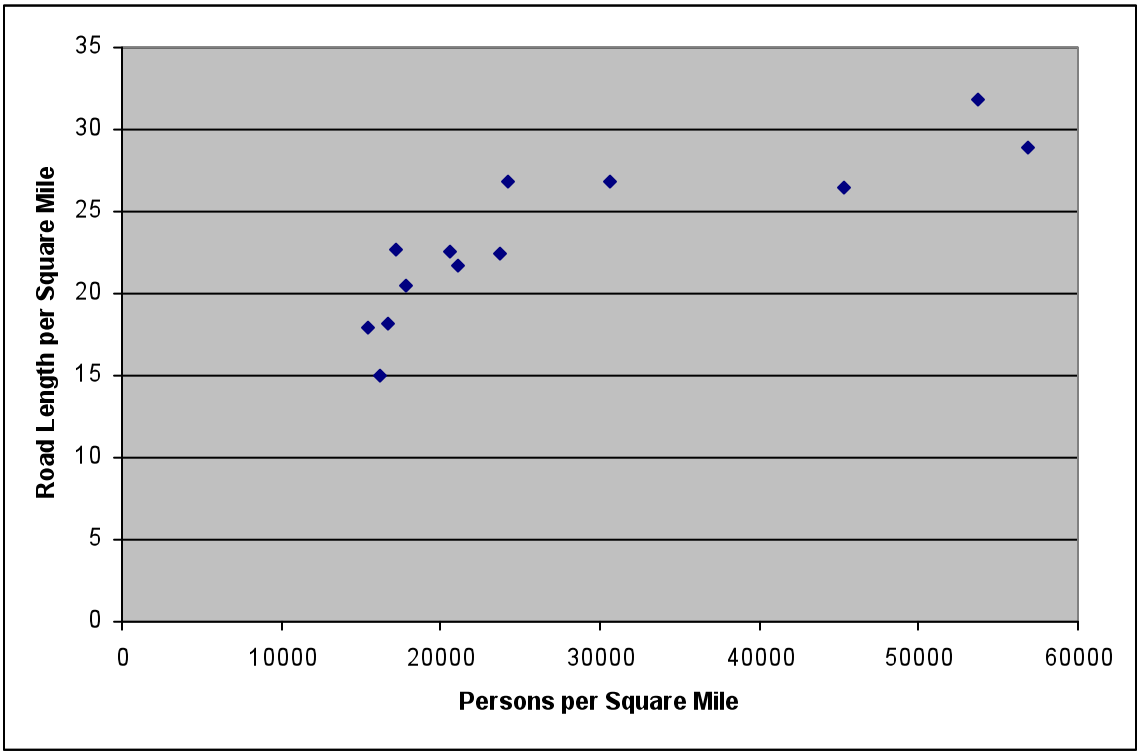
FIGURE 7. Dense-City Submodel Statistics
— Model Summary and Parameter Estimates —

Dependent Variable: Road Density

Equation	Model Summary					Parameter Estimates	
	R Square	F	df1	df2	Sig.	Constant	b1
Power	.728	29.442	1	11	.000	.436	.391

Note: The independent variable is population density in 2008.

FIGURE 8. Road Density versus Population Density — Dense City Model



Seasonal Community Submodel

In those municipalities that have sizeable seasonal populations, as do a number of towns along the New Jersey shoreline, a separate analysis is required. There are 61 seasonal communities where the Census-defined occasional-use measure is greater than 10 percent. Of these 61 municipalities, three are very small, with fewer than 100 households in 2000. None of these have population densities greater than 15,000 persons per square mile. Most (54 municipalities) have densities less than 5,000 persons per square mile.

Once again, the nonlinear power function has the greatest explanatory power. The R-square is very strong with a 75 percent explanatory power. Interestingly, the optimal breakpoint defining a seasonal community is 10 percent or more occasional use. The model is less robust at higher occasional use percentages, reflecting the seasonal heritage of these communities even as they convert to full-time.

Local Road Density = .245 * Population Density .544

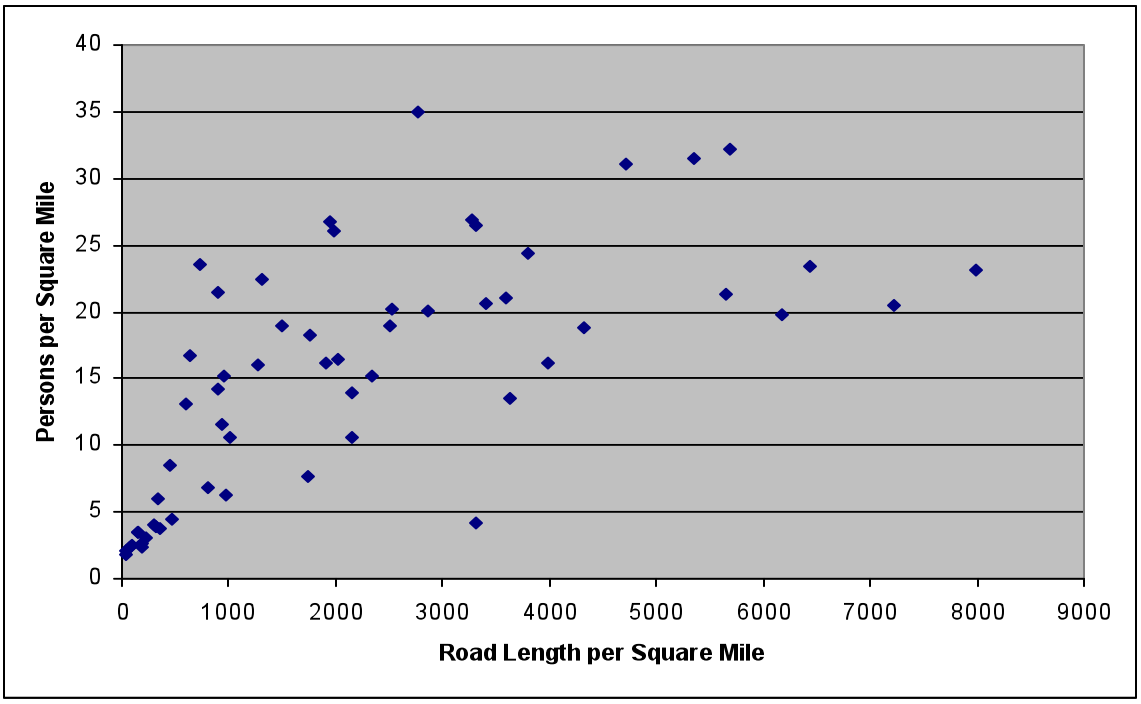
FIGURE 9. Seasonal Community Submodel Statistics
— Model Summary and Parameter Estimates —

Dependent Variable: Road Density

	Model Summary					Parameter Estimates	
Equation	R Square	F	df1	df2	Sig.	Constant	b1
Power	.747	165.263	1	56	.000	.245	.544

The independent variable is population density in 2008.

FIGURE 10. Road Density versus Population Density — Seasonal Submodel

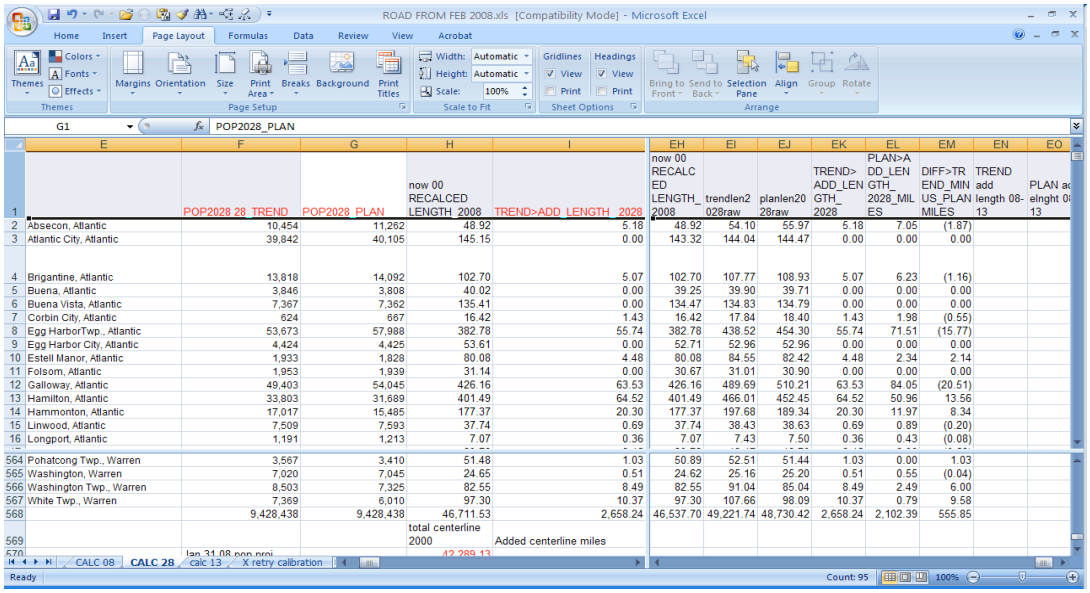


Small Community Submodel

Finally, the set of five very small municipalities is modeled assuming the ratio of road lengths to population density found in 2008 will continue into the future. The statistics related to these communities are not shown due to their small number.

Road Length and Cost Software Calculations and Explanations

The calculations for Road Length and Cost come from road.xls sheets "calc08", "calc13", and "calc28", columns EH to EM. These are passed on to 8-tables, sheet "pass on", columns EH to ES and HV to HZ and sheet "tables", rows 739 to 861.



Screen Shot of Part of Road Length and Cost Calculation

Results of the Analysis

PLAN versus TREND Findings—Road Miles			
	TREND Change 2008-2028	***PLAN Change 2008-2028***	***PLAN Change Minus TREND Change 2008-2028***
New Jersey	2,658	2,102	-556
Regions			
North	820	510	-310
South	1,839	1,593	-246
Type of Community			
Urban	139	196	57
Inner Suburban	739	923	184
Outer Suburban	1,122	703	-418
Rural	658	280	-378
Planning Area			
Metro, Suburban, Fringe	1,512	1,510	-2
Rural, Env. Sensitive	1,146	592	-554
Centers			
Large Centers (Urban, Regional, Town)	1,806	1,584	-222
All Others	852	519	-334

Source: Rutgers University, Center for Urban Policy Research projections.

PLAN versus TREND Findings— Road Costs (In Current $Millions)			
	TREND Change 2008-2028	*PLAN Change 2008-2028*	*PLAN Change Minus TREND Change 2008-2028*
New Jersey	21,266	16,819	-4,447
Regions			
North	6,558	4,078	-2,480
South	14,708	12,741	-1,967
Type of Community			
Urban	1,113	1,571	458
Inner Suburban	5,913	7,382	1,469
Outer Suburban	8,973	5,626	-3,347
Rural	5,267	2,240	-3,027
Planning Area			
Metro, Suburban, Fringe	12,100	12,083	-16
Rural, Env. Sensitive	9,166	4,736	-4,431
Centers			
Large Centers (Urban, Regional, Town)	14,449	12,670	-1,778
All Others	6,817	4,149	-2,668

Source: Rutgers University, Center for Urban Policy Research projections.

Transit Methodology

Transit in New Jersey will be evaluated using two different models. The first is a regression-based model that predicts increases in the number of people using transit based on population density and proximity to a bus or train station. The model uses information on these three variables for all 566 municipalities. A regression equation predicting change in transit users (for the worktrip) in each municipality is created. Since density of a municipality varies according to population increases under a TREND or PLAN scenario, differences between the two should be noticeable. A second community-profile model predicts change in number of transit users according to current levels of transit use. This model keeps the percentage incidence of current transit users constant by municipality and assumes that those locating to a municipality under one or the other future development scenario will adopt a pattern of transit use consistent with existing levels. This generates different transit usage levels under each scenario.

Expected Differences between TREND and PLAN

PLAN conceivably will place more population in older, mature municipalities that are both more densely developed and more likely to have transit service. Since bus or rail services are more likely to be available there, it is expected that residents will be more likely to use these services. Therefore, one can conclude that there probably will be more transit use under the PLAN development scenario.

Critical Assumptions

The measure of transit use is the percentage of transit use by municipality for the worktrip, as found in the 2000 U.S. Census and derived from the Census Transportation Planning Package (CTPP). This is influenced by those tallied by the latest 3-year release of the American Community Survey (2008). No other statewide transit-use indicator exists at this time. The use of the worktrip to estimate transit mode choice is quite reasonable: The worker is more likely to consider transit as an option for the repetitive worktrip than for a recreational, shopping, or social trip.

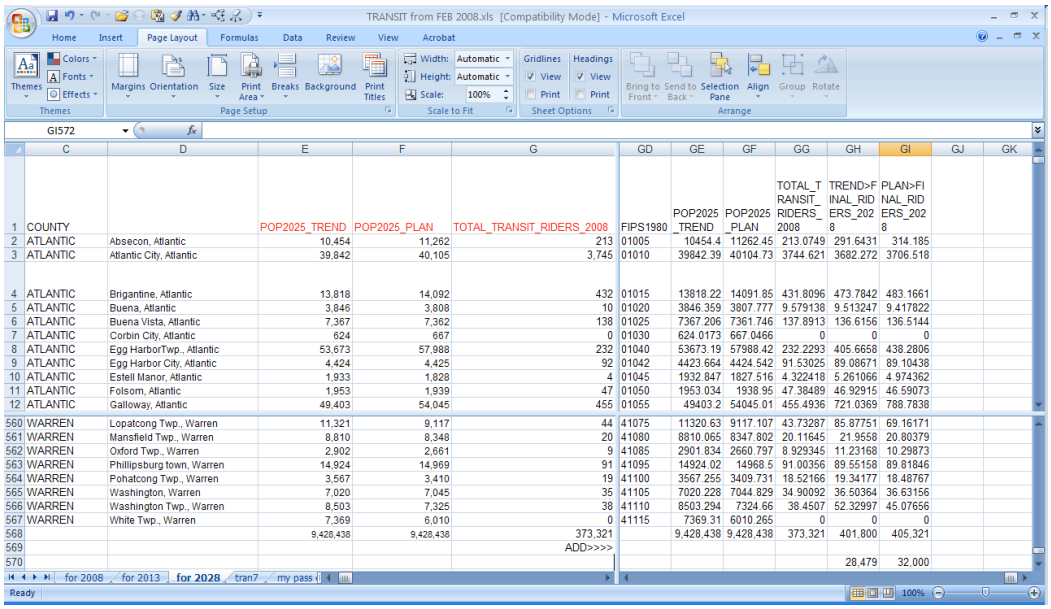
Scope and Depth of Analysis

Community Profile Model

The analysis of transit ridership predicts future transit use based on past use. Differing population projections under the TREND and PLAN scenarios by municipality multiplied by existing-use percentages also by municipality will produce different levels of populations in communities and thus different levels of new transit users. Again, the individual component of transit use considered is worktrips in 2000, influenced by those tallied by the latest three-year release of the American Community Survey.

Transit Software Calculations and Explanations

The calculations for transit come from transit.xls sheets "for 08", "for 13", and "for 28", columns GD to GI. These are passed on to 8-tables, sheet "pass on", columns EX to FC and IB and IC and sheet "tables", rows 864 to 924.



	C	D	E	F	G	GD	GE	GF	GG	GH	GI	GJ	GK
1	COUNTY		POP2025_TREND	POP2025_PLAN	TOTAL_TRANSIT_RIDERS_2008	FIPS1980	POP2025_TREND	POP2025_PLAN	TOTAL_TRANSIT_RIDERS_2008	TREND>FINAL_RIDERS_2028	PLAN>FINAL_RIDERS_2028		
2	ATLANTIC	Absecon, Atlantic	10,454	11,262	213	01005	10454.4	11262.45	213.0749	291.6431	314.185		
3	ATLANTIC	Atlantic City, Atlantic	39,842	40,105	3,745	01010	39842.39	40104.73	3744.621	3682.272	3706.518		
4	ATLANTIC	Brigantine, Atlantic	13,818	14,092	432	01015	13818.22	14091.85	431.8096	473.7842	483.1661		
5	ATLANTIC	Buena, Atlantic	3,846	3,808	10	01020	3846.359	3807.777	9.579138	9.513247	9.417822		
6	ATLANTIC	Buena Vista, Atlantic	7,367	7,362	138	01025	7367.206	7361.746	137.8913	136.6156	136.5144		
7	ATLANTIC	Corbin City, Atlantic	624	667	0	01030	624.0173	667.0466	0	0	0		
8	ATLANTIC	Egg HarborTwp., Atlantic	53,673	57,988	232	01040	53673.19	57988.42	232.2293	405.6658	438.2806		
9	ATLANTIC	Egg Harbor City, Atlantic	4,424	4,425	92	01042	4423.664	4424.542	91.53025	89.08671	89.10438		
10	ATLANTIC	Estell Manor, Atlantic	1,933	1,828	4	01045	1932.847	1827.516	4.322418	5.261066	4.974362		
11	ATLANTIC	Folsom, Atlantic	1,953	1,939	47	01050	1953.034	1938.95	47.38489	46.92915	46.59073		
12	ATLANTIC	Galloway, Atlantic	49,403	54,045	455	01055	49403.2	54045.01	455.4936	721.0369	788.7838		
560	WARREN	Lopatcong Twp., Warren	11,321	9,117	44	41075	11320.63	9117.107	43.73287	85.87751	69.16171		
561	WARREN	Mansfield Twp., Warren	8,810	8,348	20	41080	8810.065	8347.802	20.11645	21.9558	20.80379		
562	WARREN	Oxford Twp., Warren	2,902	2,661	9	41085	2901.834	2660.797	8.929345	11.23168	10.29873		
563	WARREN	Phillipsburg town, Warren	14,924	14,969	91	41095	14924.02	14968.5	91.00356	89.55158	89.81846		
564	WARREN	Pohatcong Twp., Warren	3,567	3,410	19	41100	3567.255	3409.731	18.52166	19.34177	18.48767		
565	WARREN	Washington, Warren	7,020	7,045	35	41105	7020.228	7044.829	34.90092	36.50364	36.63156		
566	WARREN	Washington Twp., Warren	8,503	7,325	38	41110	8503.294	7324.66	38.4507	52.32997	45.07656		
567	WARREN	White Twp., Warren	7,369	6,010	0	41115	7369.31	6010.265	0	0	0		
568			9,428,438	9,428,438	373,321		9,428,438	9,428,438	373,321	401,800	405,321		
569					ADD>>>>								
570										28,479	32,000		

Screen shot of part of the Transit Calculation

Results of the Analysis

PLAN versus TREND Findings—Transit Use

	TREND Change 2008-2028	*PLAN Change 2008-2028*	*PLAN Change Minus TREND Change 2008-2028*
New Jersey	28,479	32,000	3,521
Regions			
North	14,149	16,568	2,419
South	14,330	15,432	1,102
Type of Community			
Urban	9,671	12,281	2,610
Inner Suburban	9,893	13,001	3,108
Outer Suburban	7,719	5,992	-1,728
Rural	1,195	727	-468
Planning Area			
Metro, Suburban, Fringe	25,526	29,782	4,256
Rural, Env. Sensitive	2,953	2,219	-734
Centers			
Large Centers (Urban, Regional, Town)	24,842	28,316	3,474
All Others	3,637	3,684	47

Source: Rutgers University, Center for Urban Policy Research projections.

Water and Sewer Infrastructure Methodology

The CUPR Water And Sewer Demand Model forecasts the differential impacts of alternative land-use development patterns on water and sewer demand. It forecasts water and sewer demand as a function of future population and employment multiplied by use rates, combined with selected variables that have been shown to affect usage. Total population, the type of dwelling units served, and intensity of land use are among the most important factors influencing residential water and sewer demand. In general, the larger the population, the greater the proportion of single-family units; the larger the land area surrounding a dwelling unit, the larger the demand for service.

Different types of dwelling units have different water requirements associated with them. Single-family units, for example, require more water to meet landscaping needs and other outdoor water uses; multifamily units use less water for outdoor purposes. Demand for water is therefore generally higher in suburban and rural communities, where single-family homes predominate, than in urban communities, where multifamily development exists at higher ratios. Sewer demand, by contrast, depends on the amount of indoor water use. Generally, water used outdoors does not flow back into sewers.

To measure water demand, the model combines the two components of residential water use to arrive at total daily water demand: 1) daily per capita water use, which reflects indoor water use; and 2) daily water use per housing unit, which reflects outdoor water use. Indoor uses include bathing, cooking, laundering, and toilet flushing. Outdoor uses include lawn watering, car washing, and other uses such as swimming pools.

The daily per capita water-use rate used in the model has been obtained from the New Jersey Department of Environmental Protection (NJDEP). It is widely accepted and cited in the literature as a standard per capita water-use rate. This rate is multiplied by total population for each municipality to arrive at indoor water demand by municipality. To calculate the daily per-housing-unit water use, the model distinguishes between housing unit types. Water-use rates by housing-unit type, which have been obtained from New Jersey water companies, are multiplied by the number of housing units by type in each municipality to arrive at total outdoor water use. Total indoor water use is then combined with total outdoor use to determine total residential water demand per municipality. Sewer demand is based on indoor water use, with the model assuming that a share of all water used indoors will flow into a sewer system. Nonresidential demand calculations are more straightforward. Water- and sewer-use rates by type of employee are combined with change in the number of employees to arrive at nonresidential demand projections. Municipal residential and nonresidential water demands are added to arrive at a total municipal water demand projection associated with growth under the TREND scenario. The same is done to project total sewer demand. These are then aggregated to county and state levels.

Water and Sewer Infrastructure Costs

Water infrastructure is made up of several components: the water source, the treatment facility, storage facilities, and the distribution system. The cost of supplying water to new developments varies because infrastructure needs differ depending on the type of planning area in which development is occurring. In rural and environmentally sensitive planning areas (PA-4 and PA-5), infrastructure typically is nonexistent or access is difficult. Therefore, new water infrastructure in the form of dug or drilled wells and septic systems is required. In urban and suburban communities, households generally can be hooked up to existing service. In fringe communities, community package systems may be required. The first step in determining water infrastructure costs, therefore, is to isolate the planning areas where development will take place.

When water treatment plants and distribution systems are designed, their size is determined by the number of houses or buildings they will serve, with costs calculated on the number of laterals required. Thus, for new residential development, the number and type of new dwelling units is projected. To calculate the number of laterals required to service the new dwelling units, a water cost model assumes that each single-family unit will require a lateral. Multifamily units have fewer laterals than the number of apartments. For the purpose of estimating costs, one lateral is calculated for every four multifamily units. In actual practice, fewer hookups will probably be necessary to service multifamily units, but this measure is used as a rule of thumb. Overstating the number of hookups allows safe estimation of what size water treatment plant is required to service the new population. Thus, the second step in estimating water costs is calculating the number of laterals required to service projected new development. The number of laterals will equal the total number of single-family units plus the total number of multifamily units divided by four.

The water cost model assumes that new development in suburban and urban communities will be served by current water treatment facilities. According to NJDEP, new development in rural municipalities will generally require new wells, treatment facilities, and distribution systems. Where there are already facilities serving rural communities, they usually were built to serve a specific development. Thus, it can be assumed they are operating at capacity or are too far away to serve new developments cost effectively. Total water infrastructure costs are the sum of all rural and suburban/urban water infrastructure costs.

For both TREND and PLAN analyses, the model runs as described above and includes household dwelling type, planning area, municipality, development location, and the various costs associated with different types of infrastructure needs. The water cost model projects costs associated with residential and nonresidential development. The relationship between population and employment growth and water supply facility requirements is relatively straightforward. As noted, the number and type of residential dwelling units and nonresidential space are projected, enabling an estimate to be made of the water infrastructure costs associated with both types of development.

Expected Differences between TREND and PLAN

A reasonable assumption is that under TREND development residential development patterns will continue to be characterized by relatively low-density development comprising predominantly single-family homes. If the PLAN development scenario directs new residential development to existing densely developed communities with town houses and multifamily units, water demand will be less under PLAN conditions than under TREND conditions. The model measures these differences by taking into consideration dwelling unit type and the differing locations where development is occurring under the TREND and PLAN scenarios.

Water supply infrastructure costs for development under TREND are expected to differ from the PLAN regimen in several ways. To the extent that new development under the TREND scenario occurs in rural municipalities rather than suburban and urban municipalities, water infrastructure costs will be higher due to the construction of water treatment plants, except as the number of units increases and per-unit costs are reduced. Costs will be lower when development occurs in rural communities on a large scale. The model is able to calculate these differences because it takes into consideration both type of development, which affects distribution system needs, and the location of development, which affects the cost for water treatment facilities.

Sewer infrastructure costs are expected to be the lowest for two kinds of development scenarios: small, scattered developments in rural communities where no extension of sewer service is predicted and development in communities where there are ample existing capacity and low backlog needs. In the former case, this pattern of development is served by individual septic systems, which, except in northern parts of the state, cost less than extending public systems would. In the latter case, as a general rule, concentrated development reduces collector system costs. It seems unlikely that development under the TREND regimen will be so scattered that individual systems will suffice to service units. It seems more likely that increased cost savings will be realized under the more concentrated development patterns expected for PLAN development. However, cost savings will depend on where development is occurring. As discussed, sewer infrastructure needs are highly site-specific. Wherever systems are operating at or near capacity, new development may trigger much higher infrastructure costs if construction of new treatment facilities is required. Furthermore, if development occurs at sufficiently high densities, infrastructure costs may increase, because high-density development requires larger pipes, which are more expensive. The model is able to account for these differences by calculating the costs associated with development in specific municipalities, depending upon the location of growth projected under the TREND and PLAN scenarios.

Critical Assumptions

A major assumption in the analysis is that the overall mix of residential development under the TREND scenario will be characterized by larger lot sizes and more single-family units than would be the case under the PLAN scenario. CUPR projections assume that, while there will be some movement toward a greater share of single-family attached and multifamily units under TREND, more of that pattern of development will occur

under PLAN. Another assumption is that development will be encouraged in more-urban communities of the state. Therefore, outdoor water use should be less under the PLAN regimen.

The major assumption underlying the water cost model is that residential and nonresidential water infrastructure needs can be estimated according to the type of development and community where development is occurring. The model assumes that if new growth is occurring in rural and environmentally sensitive planning areas, access to infrastructure will be nonexistent or difficult. Individual wells will serve small scattered development, but new water infrastructure will be required to serve larger developments in rural areas. In communities characterized by large PA-1 and PA-2 tracts, the model assumes that units generally can be hooked up to existing service. Lands in municipalities have been assigned to planning area categories under both scenarios.

Cost assumptions for water infrastructure components—wells, distribution systems, water treatment facilities—for both the TREND and PLAN scenarios have been described above. The major assumption underlying the OSP sewer cost model is that the data collected in the Waste Water Management Plans accurately reflect sewer usage and infrastructure needs throughout the state.

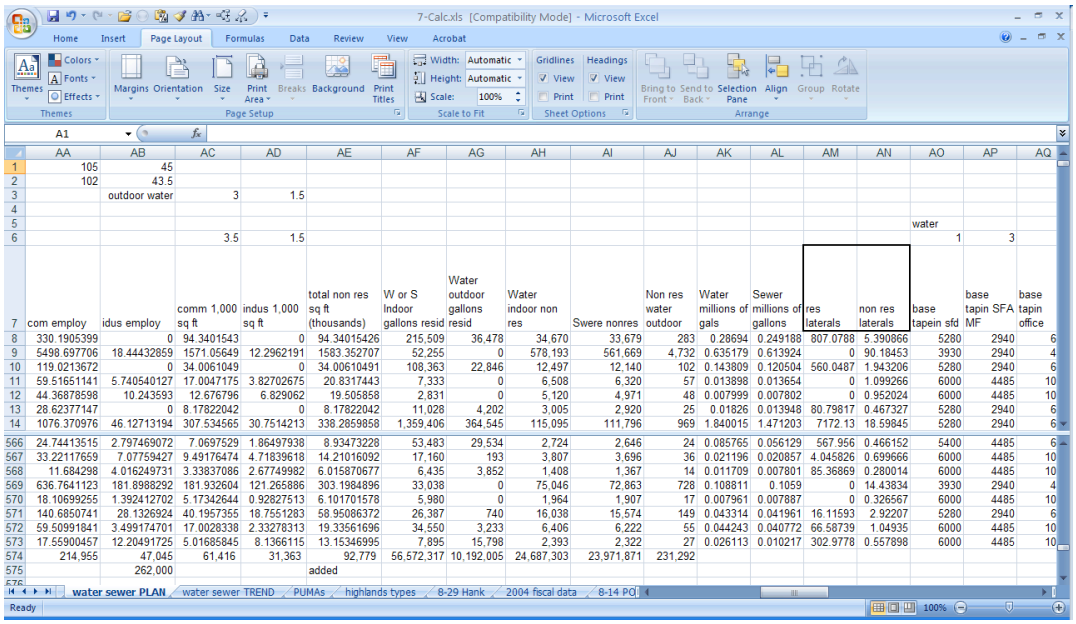
Scope and Depth of Analysis

Water demand models can include hundreds of variables for forecasting need. One model projects water demand based on a parcel-by-parcel inventory by water service area of all anticipated land-use changes for each year, as well as the water-use factors associated with new land use. Models such as these require detailed data that are difficult to obtain for large geographic areas.

An effort to compare the effects of two development scenarios, not only on water and sewer demand, but also on scores of other measures—and on a statewide basis—requires some simplification. Yet, the analysis includes variables that will highlight likely differences between the TREND and PLAN regimens. The CUPR water and sewer demand model will require data on the relevant variables at the municipal level. The scope of analysis will proceed on the municipal, regional, and state levels.

Water and Sewer Software Calculations and Explanations

The calculations for the various water and sewer measures start in 7-Calc.xls, sheets "water sewer TREND" and "Water sewer PLAN", which are basically identical except for the version of the data they work with. In both TREND and PLAN, the calculations start with examining the 1990 to 2000 change in distribution of housing type, Columns F to K, and information on the distribution of nonresidential value/parcels, Columns M to S. This information is then applied to the TREND or PLAN unit growth or job growth, Columns E and L. Various calculations are then done in Columns AA to CC, applying appropriate factors of water and sewer need and cost to the TREND or PLAN growth, including, for some calculations, the population change (Column V). The results of the water-sewer sheets are passed on to 8-tables.xls, sheet "pass on", columns GH to GQ and sheet "tables" in Rows 927 to 987.



Screen shot of part of Water and Sewer Calculations

Results of Analysis

PLAN versus TREND Findings:
Household Water and Sewer Infrastructure—Increase for the Period 2008-2028

	Water Demand (millions of gallons)	Sewer Demand (millions of gallons)	Water and Sewer Laterals (# each in 000)	Water Lateral Costs ($ billions)	Sewer Lateral Costs ($ billions)
New Jersey	(2.54)	(1.40)	(16.08)	(0.18)	(0.31)
Regions	-	-	-	-	-
North	(2.04)	(1.31)	(12.31)	(0.12)	(0.20)
South	(0.50)	(0.08)	(3.77)	(0.06)	(0.10)
Type of Community	-	-	-	-	-
Urban	5.05	4.77	10.40	0.08	0.13
Inner Suburban	8.19	6.98	25.97	0.21	0.34
Outer Suburban	(10.85)	(9.04)	(35.97)	(0.32)	(0.51)
Rural	(4.94)	(4.10)	(16.47)	(0.15)	(0.26)
Planning Area	-	-	-	-	-
Metro, Suburban, Fringe	5.43	5.16	11.92	0.07	0.12
Rural, Env. Sensitive	(7.97)	(6.56)	(27.99)	(0.26)	(0.43)
Centers	-	-	-	-	-
Large Centers (Urban, Regional, Town)	1.84	2.19	(0.68)	(0.04)	(0.06)
All Others	(4.38)	(3.59)	(15.40)	(0.14)	(0.24)

Source: Rutgers University, Center for Urban Policy Research, Projections 2008—2028.

COMMUNITY LIFE ASSESSMENT

—

Quality of Life,
Housing Supply, Demand, and Cost
Methodology and Software

COMMUNITY LIFE ASSESSMENT

Quality of Life Methodology

Regional Quality of Life

Several studies have attempted to identify those attributes of a regional location that cause people to prefer it over alternatives and to rate places on the basis of those attributes. Such studies face considerable challenges:[15]

- It is not easy to determine which variables should be considered in a measurement of quality of life. For example, it is clear that income probably has a significant impact on the quality of life of most people. Does that mean that income should be included as a component of a quality-of-life index? People may accept lower incomes and consider themselves better off if they live in an area with a lower cost of living and more natural and/or cultural amenities. Moreover, the value of those amenities will be partly—perhaps significantly—capitalized in land values and, therefore, in housing prices. Should higher housing prices be considered a negative or a positive indicator of quality of life?
- Tastes and preferences vary considerably. Some people are comfortable in an urban setting while others will go to great lengths to avoid urban areas. Some people prefer warm weather all the time; others prefer seasonal changes.
- Some attributes are valued in conjunction with others. People may prefer to be near the seashore, but only if the area is not too crowded and the weather allows them to enjoy it.
- Many attributes cannot be measured in a consistent, objective manner. The quality of cultural events and performances available to residents of a particular area, for example, is not easily measured in an objective way. Such qualitative attributes are difficult to incorporate into a quantitative study.
- Consistent and reliable data on many locational amenities are difficult to find. The larger the area and the finer the grain of a study, the less available are useful data. Even such a seemingly simple indicator as the student-to-teacher ratio is measured somewhat differently in various states' school districts.
- Many attributes are strongly correlated. When combined with the lack of available data for other attributes, this leads to seemingly inconsistent findings. For example, people might say they dislike certain attributes, but those same undesirable attributes prevail in the places where they prefer to live. The reason for the apparent inconsistency is that the undesirable attributes are correlated with desirable attributes for which data are not available, and so the undesirable attributes pick up the effects that should be ascribed to the omitted variables.
- Making locational comparisons requires more than identifying and measuring the attributes that influence people's locational decisions. Weights must be assigned to the various attributes; small differences in weightings can lead to large changes in rankings.

The scope of this research effort meant that the research team had to either adopt or alter a set of standardized indicators of quality of life or leave this type of analysis out of the evaluation. The choice made by the research team was to alter a set of standardized

[15] Burchell et al., "Quality of Life in the United States," *Costs of Sprawl 2000*, op.cit.

indicators of quality of life and to use it to evaluate two different development futures for New Jersey. This analysis attempted to address the following key research questions:

- If one had the power to move a household from the municipality to which it was assigned by a long-run population forecast to a different municipality, would that household experience a change in its quality of life?
- Specifically, if the household could be moved from a TREND (uncontrolled growth) community to a PLAN (controlled growth) community (as defined in other sections of this analysis), would the household's quality of life change? What is the statewide significance of this change in quality of life once all households have been so moved?

One of the most widely used models for estimating the value of the quality of life associated with regional location was developed and estimated by Stuart Gabriel of USC, Joe Mattey of the Federal Reserve Bank of San Francisco, and William Wascher of the Federal Reserve Board of Governors. The Gabriel et al. model is used to compare quality of life in one state versus another. It is an econometric model whose regression coefficients and signs predict housing expenditures and wages related to the amenity of location.[16] The goal of this section of the analysis was to employ a modified version of Gabriel et al.'s model in the comparison of quality of life at the local level. Local quality of life is controlled by quality of life at the regional level, under the alternative growth scenarios (TREND and PLAN). The comparison could not be done unless there was agreement among research team members about what constitutes quality of life at both of these levels. The variables from the Gabriel et al. model were retained, altered, and supplemented to achieve "recognizable" indicators of regional (county) quality of life. A set of variables depicting local (municipal) quality of life was folded into the county ratings. The procedures for determining each of these quality-of-life measures are explained below.

Regional Quality of Life: The Creation of a Quality-of-Life Rating for Counties

The following changes were made to Gabriel et al.'s variables before they were used in the county quality-of-life rating. The signs of the regression coefficients for five of the 24 variables were changed. States with (1) less sunshine, (2) higher rates of violent crime, (3) higher state and local property taxes, (4) more expenditure on higher education, and (5) more expenditure on welfare were associated with higher quality of life in Gabriel et al.'s regression equation. The signs of these variables were reversed when used in this analysis. Further, the influence of some variables (regardless of sign) on counties appeared to be too strong: the presence of a coast (within 100 miles), better air quality (particularly low levels of carbon monoxide), a low number of hazardous waste sites, low student-to-teacher ratios, and significant funding for higher education and highways. The effects of these variables were reduced to one-quarter of their original influence.

In addition, the following variables seemed to have inconsistent effects because the data were usually not reported at the county level: (1) the amount of federal land that existed statewide, (2) whether or not the state environmental protection laws were lenient, (3) the number of visits to national parks per 100 people in the state, and (4) the number of visits

[16] Gabriel et al., op.cit.

to state parks per 100 people in the state. These four variables were eliminated from the analysis.

Other key variables were missing from Gabriel et al.'s list of variables because they were accounted for in the structure of the regression. The following variables needed to be added: wealth of the county; share of the population that is of working age; percentage of the population, aged 25 and older, with a graduate degree; a cost-of-living index for the county; future population growth; and employment growth in the county. These additional variables, with the deduction of the four above, expanded the original variable set to 26. Population growth and employment growth were found to exert too much influence and were reduced to one-quarter of their original effects. All regional quality-of-life variables are shown in the following table.

Variables Used in the Regional Quality-of-Life Ranking of Counties

Variables	*Correlation between Variable and Quality of Life*	*Weighting*
Weather		
1. Average annual rainfall	-	1
2. Morning and evening humidity	-	1
3. Heating degree days	-	1
4. Cooling degree days	-	1
5. Wind Speed	-	1
6. Sunshine days	+	1
Amenities		
7. Coast Location	+	¼
8. Inland water bodies	+	1
9. Hazardous waste sites	-	¼
10. Air Content—ozone	-	1
11. Air Content—carbon monoxide	-	¼
Socioeconomic		
12. Cost-of-living index	-	1
13. Commuting time	-	1
14. Violent crime rate	-	1
15. Student-to-teacher ratio	-	¼
16. Wealth index	+	1
17. Working-age population	+	1
18. Population with a graduate degree	+	1
Public Finance		
19. State and local income taxes	-	1
20. State and local property taxes	-	1
21. State and local sales tax	-	1
22. Expenditures on higher education	+	¼
23. Expenditures on public welfare	-	1
24. Expenditures on highways	+	¼
Growth		
25. Population growth	~ +	¼
26. Employment growth	~ +	¼

Notes: A (+) sign indicates a positive correlation between the variable and quality of life; a (-) sign indicates a negative correlation between the variable and quality of life; a (~+) sign indicates that for population growth and employment growth there is a positive correlation between the variable and quality of life, except for extreme high growth, which is given a middle rating.

Sources: Gabriel et al., June 1996, "Compensatory Differentials and Evolution of the Quality of Life among U.S. States" (as adjusted by CUPR, Rutgers University, 2009).

All variables—except for the population- and employment-growth scores and cost of living, which were scored individually—were standardized so the mean of the variable was zero and the standard deviation was one. Values lower than (-)1.5 were made equal to (-)1.5, and values above 1.5 were capped at 1.5. A value of 1.5 was then added to the original score to allow all scores to be positive, and it was doubled to arrive at a range of 0 to 6, with 6 representing the best score. The data were then scaled to conform to a range of 1 to 5 to make them consistent with the ratings for local quality of life. The variables for a county were then averaged to arrive at a quality-of-life score, with eight of the 24 variables counted as one-quarter of their original value.

Local Quality of Life

The quality-of-life rating also encompasses local quality of life. A local quality-of-life rating, based on the six component variable sets outlined below, was developed for each municipality. This rating varies from 1 (the lowest rating) to 5 (the highest rating). The six components developed to measure quality of life in New Jersey municipalities are the same as those in the original impact assessment:

- *Economic well-being.* This component ranks communities on the basis of their median income and the relative size of their dependent population. Three variables are used in this component: median household income; Temporary Assistance to Needy Families (TANF) caseloads per capita; and the community homeless count per capita. Quality of life is assumed to be proportional to median income and inversely related to the proportion of welfare recipients and homeless people in a municipality.
- *Housing value and ownership.* Three variables are indexed for the homeownership component: percentage of residents who are homeowners; median housing value; change in median housing value. A better quality of life is assumed to be directly related to higher rates of homeownership, higher median housing values, and larger increases in housing values.
- *Property tax base and rate.* The tax component is based on two variables: equalized tax rates and tax base per capita. Quality of life is assumed to be inversely related to tax rates and directly proportional to taxable wealth per capita. In other words, life is better when taxes are low and ratables are plentiful.
- *Public safety.* This component assesses quality of life from the perspective of personal safety, protection of property, and public investments in policing. Five variables are used in this component: violent crimes per capita; change in violent crimes per capita; nonviolent crimes per capita; change in nonviolent crimes per capita; and public-safety expenditures per capita. Quality of life is assumed to be positively related to lower levels of crime against people and property, lower rates of increase in crime, and higher per capita expenditures for police.
- *School achievement.* This component measures the performance of the local educational system using two variables: average reading scores and high school dropout rate. Quality of life is assumed to be higher in communities that maintain high reading scores and low dropout rates.
- *Community amenities.* This component concerns municipal provision of public goods and services that enhance local quality of life. Because of data limitations, the measure does not include private activities, nor does it capture a wide range of cultural amenities. Three

variables are used in this component: capital expenditures per capita; recreation expenditures per capita; and library expenditures per capita. Quality of life is assumed to be positively related to higher expenditure levels in each of these areas. The use of recreation expenditures skews this quality-of-life component somewhat in the direction of shore communities, which spend large amounts of money on beaches, boardwalks, and other ocean-related recreational facilities and activities.

What emerges from these measures is a composite ideal community characterized by affluent residents, high rates of homeownership, low taxes, good schools, attractive amenities, and little crime or poverty. In real life, trade-offs exist, for example, between low taxes and good schools or local amenities. The results of this assessment reflect these trade-offs, since certain communities rank higher on some measures than on others.

Variables Used in the Local Quality-of-Life Ranking of Municipalities

Variables	*Correlation between Variable and Quality of Life*	*Weighting (%)*
Economic Well-being		
1.Median Income	+	5.55
2. TANF caseloads	-	5.55
3. Community homeless count	-	5.55
Housing Value and Ownership		
4. Percentage homeownership	+	5.55
5. Median housing value	+	5.55
6. Change in median housing value	+	5.55
Property Tax Base and Rate		
7. Equalized tax rates	-	8.35
8. Tax base	+	8.35
Public Safety		
9. Violent crimes	-	3.35
10. Change in violent crimes	-	3.35
11. Nonviolent crimes	-	3.35
12. Change in nonviolent crimes	-	3.35
13. Public safety expenditures	+	3.35
School Achievement		
14. Average reading scores	+	8.35
15. High School Dropout Rate	-	8.35
Community Amenities		
16. Capital expenditures	+	5.55
17. Recreation expenditures	+	5.55
18. Library expenditures	+	5.55
Total		**100.00**

Notes: A (+) sign indicates a positive correlation between the variable and quality of life; a (-) sign indicates a negative correlation between the variable and quality of life.

Source: Robert W. Burchell et al., *Costs and Benefits of Alternative Growth Patterns: 2000 Impact Assessment of the New Jersey State Plan.*

Different people also value different community attributes. Parents with school-age children value good schools more than other residents do. Tastes in community amenities vary widely, as does the willingness to pay higher taxes for them. The quality-of-life evaluation attempts to deal with diversity by including a wide range of measures and by emphasizing a set of community attributes that are widely valued by most citizens of New Jersey.

In developing the quality-of-life components, Z-scores were calculated for each component variable. These variable scores were weighted equally in calculating the Z-scores for each component. Thus, for example, the community-amenity component weights capital, recreation, and library expenditures as one-third each.

Local Quality of Life: The Creation of a Quality-of-Life Rating for Communities

The overall quality-of-life index was constructed by combining the six quality-of-life components, weighting each equally, and dividing by the number of measured components. The six quality-of-life components, as described above, are economic, housing value and ownership, property tax base and rate, public safety, school achievement, and community amenities. The quality-of-life index assigns equal importance to each of these components. For all but four of the 566 municipalities (Montague, Pine Valley, Tavistock, and Teterboro), data are available to calculate each of the six quality-of-life components. In the aberrant cases, the quality-of-life index is calculated using the average of the calculated quality-of-life components.

Quality-of-Life Rankings of Municipalities

Overall Index	*Quality of Life Range*	*Number of Municipalities*	*Ranking*
5	4.00-5.00	148	Well above average
4	3.30-3.99	104	Above average
3	2.70-3.29	80	Average
2	2.00-2.69	100	Below average
1	1.00-1.99	134	Well below average

Source: Center for Urban Policy Research, Rutgers University, 2009.

Weighting variables equally in developing the quality-of-life components, and weighting the six components equally in calculating the quality-of-life index, results in relative weights for the 18 variables that make up the quality-of-life index. The assigning of weights to the 18 individual variables was done in order to maintain equal weighting of the six major components of quality of life.

Municipalities were ranked according to the quality-of-life index in approximate quintiles. Because a denominator of six was used in calculating the quality-of-life index for almost all communities, this scale was divided into 0.167 increments ranging from the highest quality-of-life index rating of 5.00 to the lowest rating of 1.00.

Expected Differences between TREND and PLAN

Quality-of-life ratings are higher in the farther-out suburbs and rural communities than in the close-in suburbs and redeveloping cities. This means a reduction in the quality of life of those residents that are redirected toward close-in suburbs and cities under the PLAN regimen. The expectation is that under TREND conditions, householders will choose to live in municipalities in farther-out communities that offer primarily single-family development, growing tax bases, low crime rates, and low proportions of dependent populations. Quality of life will be better there. Under the PLAN scenario, a share of population and employment growth is likely to emerge in some of the redeveloping areas of the state. The initial expectation is that, under PLAN development, some portion of overall population growth will occur in municipalities with lower quality-of-life scores. Hence, people living in those municipalities will experience a lower quality of life.

It is possible that redirecting population growth to urban communities will, in the long run, raise the quality of life found there—just as adding population to rural and undeveloped areas may at some point change the character of those communities in ways that reduce the measures of quality of life. The increased investments in commercial and industrial property in urban communities associated with growth will enhance the tax base of these communities, thereby adding to local revenues and municipal capacity for providing public services. The human and physical capital put into these locations can, in the long run, reap rewards. It is anticipated that this will have a positive influence on overall quality of life and serve to diminish the historical disparity between urban and exurban locations.

Critical Assumptions

There are several critical assumptions that enter into a quality-of-life assessment model:

- Quality-of-life measures used in this study offer only limited insight into the true nature of quality of life.
- Under TREND conditions, municipalities that have grown in the past will basically continue to grow; municipalities that have declined will continue to decline. PLAN attempts to redirect growth among municipalities in the state, continuing growth at an abated pace in many towns and slowing decline in other municipalities.

- The quality-of-life analysis assumes that counties and municipalities are the appropriate geographic units of analysis at which to measure the quality of community life. Counties are assumed to be the appropriate scale for regional quality-of-life analysis; municipalities are assumed to be the appropriate scale for local analysis.
- In constructing the quality-of-life rating, it has been assumed that each component of the quality-of-life index is equally important—except for eight variables in the regional quality-of-life analysis.
- The impact of the addition to the nonresidential tax base of a community is reflected in the level of the community's quality of life. This variable constitutes a community wealth index that signals the community's fiscal and economic health. The variable reveals that improvement in the quality of life is closely related to the community's ability to secure an enhanced fiscal posture.
- Where communities are growing, the full value of nonresidential ratable addition is taken; where communities are in decline, only one-half of any reductions in the value of nonresidential ratables is taken. The latter reflects the situation of building owners who, even in the face of reduced demand for space, continue to pay essentially the same level of taxes on the building.
- Quality of life is experienced differently by workers and residents. The quality of life in a particular community is less significant to a worker, who spends only working hours there, than it is to a resident. In calculating the aggregate quality-of-life exposure level in a community, the addition of employment to a community multiplied by the quality of life found there is weighted as one-third that of the addition of households multiplied by the quality of life of the community. This is because residents are in the community for much more than the typical workday.
- The projection of current levels of quality of community life adjusted by nonresidential ratable growth is a fair indication of quality of community life in the future.

Scope and Depth of Analysis

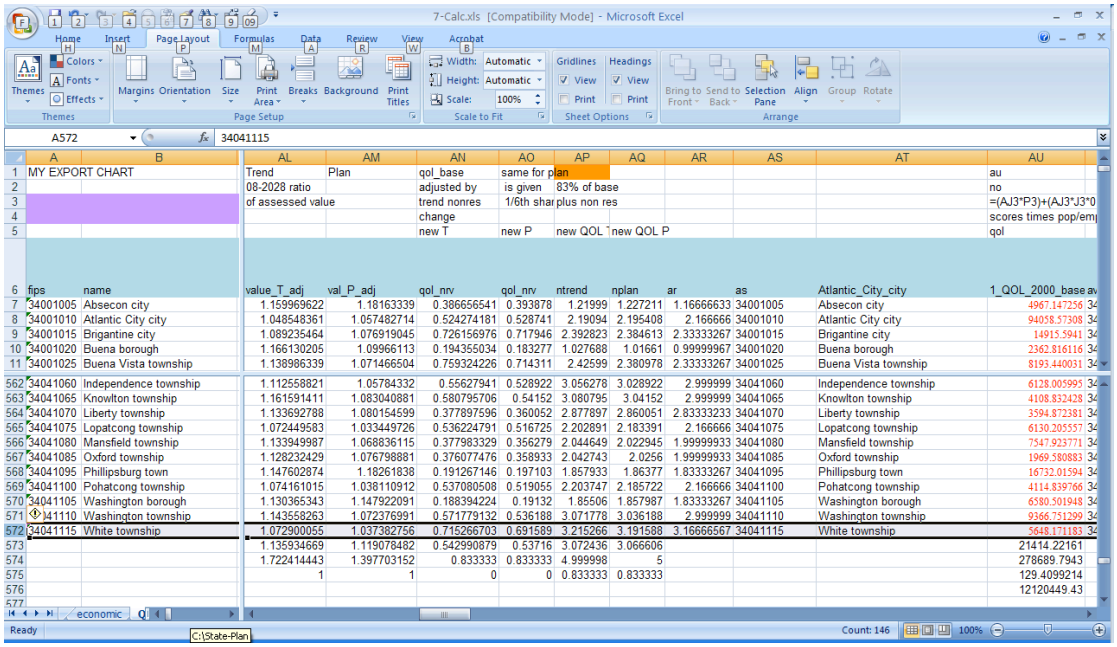
Each quality-of-life component encompasses two to five static or dynamic variables that vary from municipality to municipality. Households and employees are located in communities for the years 2008 to 2028 according to population projections and historical location patterns (TREND) or the specific growth components inherent within the State Plan (PLAN). The resultant quality-of-life score for a community at two points in time is a weighted product of the number of households and jobs located in a community and its associated quality-of-life rating.

A municipality's quality-of-life rating can change over time. The quality-of-life assessment model allows for the possibility of change by incorporating a dynamic element in the assessment. The addition of nonresidential tax-ratables in TREND and PLAN is one measure of quality of life. The total increase in commercial and industrial employment in each municipality, and the value of the structure these employees occupy, signal economic vitality in a community. A host of other variables likewise indicate whether a community is safe, has intellectual resources, and has parks and playgrounds for recreation as well as museums and restaurants for entertainment.

The TREND and PLAN development scenarios are assessed by comparing aggregate quality-of-life totals. In addition to an aggregate total for the state, the data is partitioned (north, central, and south) to facilitate a regional analysis.

Quality of Life Software Calculations and Explanations

The Quality of Life calculations start in 7-calc.xls, sheet "QOL". The adjustment of QOL scores based on change of nonresidential value is done in Columns CG, CH, and CI along with Columns AL and AM. The final town scores are in columns DA, DB, and DC. These results are passed on to 8-tables, sheet "more pass on", columns BG to BM, and are finally displayed in the "tables" sheet in rows 1448 to 1509.



Screen shot of part of Quality of Life Calculation

Results of the Analysis

PLAN versus TREND Findings—Quality of Life Index			
	TREND Change 2008-2028	**PLAN Change 2008-2028**	**PLAN Change Minus TREND Change**
New Jersey	0.032	0.026	-0.006
Regions			
North	0.049	0.044	-0.005
South	0.014	0.007	-0.007
Type of Community			
Urban	0.037	0.045	0.008
Inner Suburban	0.022	0.024	0.002
Outer Suburban	0.039	0.019	-0.020
Rural	0.054	0.028	-0.025
Planning Area			
Metro, Suburban, Fringe	0.025	0.026	0.001
Rural, Env. Sensitive	0.048	0.028	-0.020
Centers			
Large Centers (Urban, Regional, Town)	0.037	0.036	-0.002
All Others	0.024	0.012	-0.012

Source: Rutgers University, Center for Urban Policy Research, Projections 2008—2028.

Housing Supply, Demand, and Costs Methodology

Housing-unit projections are undertaken using household projections, to which are applied vacancy rates unique to each community. In much the same way as the population-to-household ratio change adjusts the municipal base of households, vacancy-rate change is also used to adjust the municipal base of housing units. Again, the projection period end number of total housing units in a community is subtracted from the base number to generate the increment in housing units in that community over the projection period. A housing-unit vacancy rate of 7.5 percent is used for 2000; about 7.6 percent is used for 2008; and 7.0 percent is used for 2028. Housing-unit projections directly follow household projections and differ from these projections only by the standing vacancy rate. Housing-unit projections for the period 2008–2028 reflect the period 2000–2008 and have been checked for reasonableness against population estimates at various points within this period.

In the analysis conducted for PLAN, different communities are projected to have different numbers of new housing units. This is determined according to household projections for the community. The analysis conducted for communities' 2008–2028 housing growth increments also reflects the distribution of new housing units delivered

from 1990 to 2000. The total housing unit projections for each municipality under the TREND and PLAN scenarios are equivalent to household projections plus a vacancy rate. The 2000 U.S. Census vacancy rate by municipality is used to estimate the additional housing required to account for vacancy in each community.

Projected Housing-Unit Growth—
TREND and PLAN
—
State of New Jersey, 2000–2028

Year	*Housing Units*	*Change from Prior Period*
2000	3,310,275	
2004	3,414,916	
2008	3,517,293	207,018
2013	3,557,696	
2018	3,617,068	
2023	3,693,400	
2028	3,781,464	264,171

Source: 2000-2008 U.S. Census estimates

The difference in the statewide distribution of housing units under PLAN versus TREND is the difference in the increment of units destined for a community multiplied by the composition of unit change for that community under TREND or PLAN conditions, added to similar numbers for each of the other 565 municipalities.

Housing affordability over the projection period for the TREND and PLAN scenarios is calculated for each community by creating a distribution of 2028 income and comparing it with a distribution of 2028 housing-unit rent (capitalized) and value. In each community, income for the period 2008 to 2028 is increased annually by the 2007 through 2009 Consumer Price Index change (3 percent per year), and rent and value are increased annually by the observed national housing price increase for 1970 through 2008. This averages 4 percent per year. In each community, the housing value for 2028 is arrayed against the income of those likely to occupy those units. All housing is expressed in value terms; rental housing is converted to value by multiplying monthly rent times one hundred. A unit is deemed affordable in a community if it is valued at no more than 2.5 times annual household income. Households destined for a community under TREND are arrayed against the housing offerings in a particular community; households destined for a community under PLAN (usually more or fewer households than under TREND) are similarly arrayed against the housing offerings found there. This results in a percentage of households under each scenario being able to afford the housing offered locally. The summation of 566 matches of income versus housing price under TREND is compared with 566 matches under PLAN. The summation of PLAN matches minus the summation of TREND matches is the comparison of affordability for the two scenarios.

These results are shown by region, municipality type, communities with more or less densely developed planning areas, and communities with or without urban, regional, and/or town centers.

Expected Differences between TREND and PLAN

Housing Demand and Supply

It is expected that there will be a relatively close relationship between housing supply and housing demand in overall numbers under TREND and PLAN development, but significant mismatches in both the location and the type of housing delivered versus housing required. One would expect that, under TREND, more housing would be supplied than required in the northern part of the state, and that more single-family housing would be built as a share of all housing than required everywhere in the state.

One would further expect that TREND and PLAN development would demand similar numbers of units at the state and regional levels but significantly different numbers of units below the regional level. TREND would require more units in suburban and rural communities, in communities with less densely developed planning areas, and in communities without large centers. PLAN development would require more units in urban communities, in communities with more densely developed planning areas, and in communities with urban, regional, and/or town centers.

Housing Affordability

It is expected that housing affordability would generally increase in the future as a result of the post-2007 relationship between the rate of housing cost increase and the rate of increase of the Consumer Price Index (CPI). This is further compounded by the fact that the greatest share of single-family units as a percentage of all housing built since the 1950s was constructed in the 2000s. This is typically the least affordable type of housing because most of it is single-family detached and single-family attached ownership housing.

It is also expected that, since PLAN development will encourage growth in urban communities and in communities with urban, regional, and/or town centers, affordability should increase less under PLAN because of the lower prices and mix of non-single-family housing found in these locations.

Finally, PLAN should generally increase affordability in urban communities—the household incomes destined for suburban locations under TREND conditions will be more than adequate for most urban housing offerings.

Critical Assumptions

Housing Demand and Supply

It is assumed that actual housing supply will accurately reflect recent building permit numbers and locations throughout the state, and that the prior decade is the best barometer of where housing is likely to be delivered in the future. It is further assumed that housing demand will parallel the projected household growth of each development scenario both in overall numbers and in location. No attempt will be made to match demand with supply by type of unit (single-family or multifamily) other than by the actual or capitalized cost of the dwelling units.

Since housing is a regional market and since commuting times are quite significant and municipalities physically small in New Jersey, there should be significant mismatches between supply and demand at any geographical division below the regional level.

Housing Affordability

Housing is deemed affordable if it costs no more than 2.5 times annual gross household income. Further, the value of a rental unit is equivalent to 100 times its monthly rent. Finally, trends in housing affordability for the future reflect some increase in affordability that diminishes over time.

Scope and Depth of Analysis

Housing Demand and Supply

In order to undertake the housing demand and supply analysis, households destined for individual communities are paired with existing housing relative to simple distributions of household income and similar distributions of housing price. This is done for all households that will be formed during the period 2008 to 2028 under each development scenario for the community in which housing is being sought. Results for the 566 communities are summed by type, location, density of development, center presence, and other characteristics of communities.

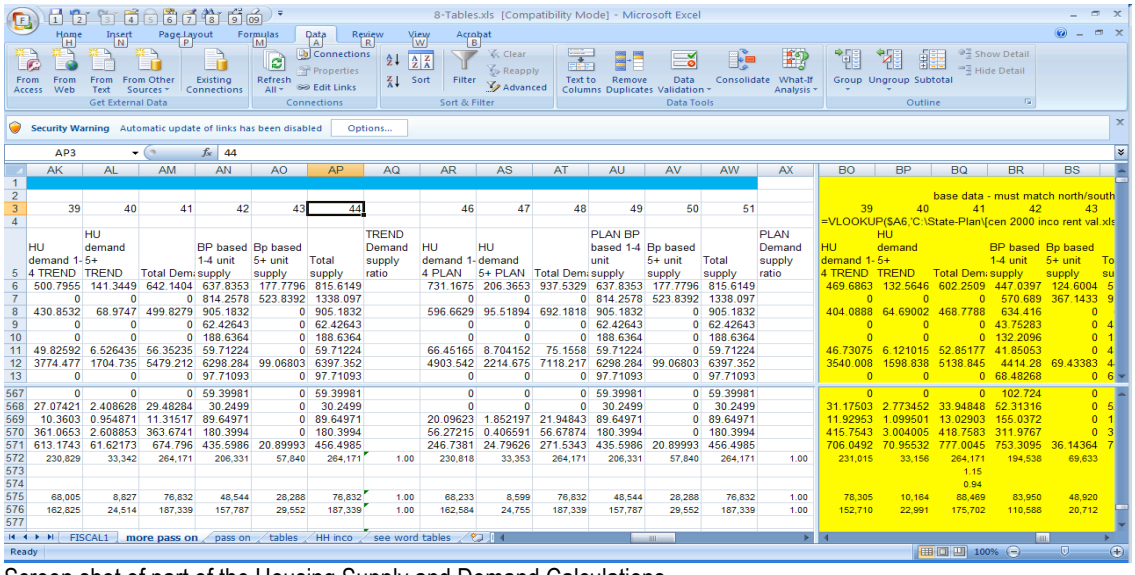
Housing Affordability

Housing affordability is calculated for each household; its income is distributed against the array of housing available by price in the location where housing is being sought. The analysis is initiated at the community level and summed to groupings of communities according to desired levels and types of analysis. No attempt is made to match households with housing units using socioeconomic characteristics other than household income.

Housing Supply and Demand Software Calculations and Explanations

The calculations for housing supply and demand appear in "cen 2000 inco rent val.xls". Census information on unit type 2000 appears in columns EZ and FA. This information is combined with TREND housing unit information (Columns FF and FG) to generate an estimate of housing unit demand by type (1-4 unit vs. 5+ units). Housing unit demand information for PLAN is generated in Columns GN and GO using PLAN dwelling unit information from Columns FJ and FK. Housing unit supply (Columns GJ and GK) is generated from building permits by type (1-4 units or 5+ units) for 2000–2008 (Columns EV and EW). This information is passed on to 8-tables.xls, sheet "more pass on", with Census and building permit information initially copied to columns BO to CB. The calculations in these columns receive a final adjustment with the result appearing in columns AK to AX and are then passed on to sheet "tables", rows 1513 to 1593.

The calculations for housing affordability start in "cen 2000 inco rent val.xls" and in "cen 2000 inco rent val for 2008 aff.xls". Both these workbooks contain base 2000 Census data for household income, rent for rental units, and value of owner-occupied units for every municipality in the state (in sheet "data"). This information is then processed in the sheet "data2" to array the income into 13 groups (Columns F to R) and to array the rent or an estimate of owner cost into 13 corresponding categories of what rent/value can be afforded by the income group (Columns U to AG). These 26 groups are then adjusted to match the TREND 2028 household and housing unit distributions (Columns AN to BN), and these distributions are then compared to see how many of the units can actually be afforded by the projected households (Columns BQ to CD). Columns CH to EO repeat this process for PLAN 2028 households and housing units. This process is also repeated in "cen 2000 inco rent val for 2008 aff.xls" using the base 2008 household and housing-unit information instead of TREND or PLAN. The affordable units appear in 8-tables.xls, sheet "more pass on", columns BB, BE, and CH, and are then passed on to sheet "tables", rows 1513 to 1593.



Screen shot of part of the Housing Supply and Demand Calculations

Results of the Analysis

PLAN versus TREND Findings: Housing					
	1-4 Unit Structures	5+ Unit Structures	Total Units	PLAN Demand/ TREND Demand	Affordability 2028 (%)
New Jersey	-12	12	0	1.00	0.01
Regions					
North	229	-229	0	1.00	0.02
South	-240	240	0	1.00	0.00
Type of Community					
Urban	14,326	1,109	15,435	1.44	0.00
Inner Suburban	27,957	4,521	32,477	1.31	0.01
Outer Suburban	-30,063	-3,578	-33,641	0.65	0.03
Rural	-12,232	-2,040	-14,271	0.46	0.03
Planning Area					
Metro, Suburban, Fringe	21,022	3,233	24,255	1.12	0.01
Rural, Env. Sensitive	-21,034	-3,221	-24,255	0.62	0.03
Centers					
Large Centers (Urban, Regional, Town)	10,847	1,020	11,868	1.06	0.01
All Others	-10,859	-1,009	-11,868	0.79	0.02

Source: Rutgers University, Center for Urban Policy Research, Projections 2008–2028.

INTERGOVERNMENTAL COORDINATION

—

Methodology and Software

INTERGOVERNMENTAL COORDINATION METHODOLOGY

Expected Differences between TREND and PLAN

Since a central purpose of the State Planning process is to increase intergovernmental coordination, it is expected that respondents would report higher levels in the frequency and quality of communication between counties, between counties and municipalities, and between counties and state agencies under the State Planning process. It is also expected that respondents would report higher levels in the frequency and quality of communication between municipalities and between municipalities and the state government under the State Planning process.

Correlation is not causality. Other factors may be at play. In an effort to help identify causal factors, respondents are encouraged to discuss reasons for any changes that they believe occur in intergovernmental relationships attributable to the State Planning process.

Critical Assumptions

Both the quantity and the quality of intergovernmental contacts are measured in the analysis that follows. The quantitative component measures the perceived frequency of contact between state, county, and local governments under the State Planning process and in the absence of that process. The qualitative component measures the content of intergovernmental exchanges under the same two scenarios. The conditions existing in the absence of the State Planning process are termed TREND intergovernmental coordination conditions, and conditions existing under the State Planning process are termed PLAN intergovernmental coordination conditions.

Scope and Depth of Analysis

Intergovernmental coordination is measured by interviewing county planning directors for their views on intergovernmental interaction. These individuals were asked to identify the frequency and quality of their contacts with state agencies, other counties, and local governments with and without a State Planning process. Because it is not feasible to survey every municipal government in the state, county respondents were also asked to provide their assessment of the frequency and quality of contacts occurring between municipalities and between municipalities and state agencies under TREND and PLAN.

In brief, the survey questionnaire dealt with intergovernmental contacts (frequency and quality) with and without a State Planning process. Respondents were asked to select answers from a list of precoded choices. For example, with respect to the frequency of contact with other governmental agencies, responses were distributed on a scale of 1 to 5 as follows: 5, very frequent; 4, frequent; 3, average; 2, infrequent; 1, very infrequent. With respect to the quality of contact with other governmental agencies, the coded responses also ranged on a scale of 1 to 5. These were 5, excellent; 4, adequate; 3, neutral; 2, inadequate; 1, poor. Respondents' answers were tabulated by dividing the sum

of the numerically coded replies (1 to 5 for each respondent) by the number of respondents (21), thus providing an average raw score for the 21 counties on each question. These scores were then compared for the TREND and PLAN analysis. The counties' mean response to the frequency and quality of county-to-county contacts in the absence of the State Planning process was compared with the mean response to the frequency and quality of the contacts with the State Planning process in place. A difference-of-means test was applied to the results. This exercise was repeated for county-to-municipality, county-to-state, municipality-to-municipality, and municipality-to-state exchanges. Only results below the 0.05 level of statistical significance were reported. The 0.05 level of statistical significance is typically used in social science surveys; it indicates that there is only a 5 percent probability that the observed difference could be the result of random variation

Results of the Analysis

PLAN versus TREND Findings: Intergovernmental Coordination

	County to County	***County To Municipality***	***County To State***	***Municipality To Municipality***	***Municipality to State***
Difference in frequency rating under TREND/PLAN	0.6	1.1	0.9	0.7	1.0
Significance and significance level of difference in frequency rating	Significant (0.001)	Significant (0.000)	Significant (0.000)	Significant (0.001)	Significant (0.000)
Difference in quality rating under TREND/PLAN	0.6	1.3	0.6	0.5	1.0
Significance and significance level of difference in quality rating	Significant (0.003)	Significant (0.000)	Significant (0.010)	Significant (0.000)	Significant (0.000)

Notes: Frequency: 1 = no contact; 2 = infrequent; 3 = average; 4 = frequent; 5 very frequent
Quality: 1 = poor; 2 = inadequate; 3 = neutral; 4 = adequate; 5 = excellent

Source: CUPR, Rutgers University, County Intergovernmental Coordination Survey, Summer 2005

County	Sum of Means	Pattern
Union	8.5	VH
Hunterdon	8.0	VH
Camden	6.0	H
Cape May	6.0	H
Cumberland	6.0	H
Essex	6.0	H
Sussex	6.0	H
Passaic	5.5	H
Bergen	5.0	M
Monmouth	5.0	M
Atlantic	4.0	M
Burlington	4.0	M
Gloucester	4.0	M
Morris	4.0	M
Ocean	4.0	M
Mercer	3.5	L
Middlesex	2.0	VL
Somerset	1.0	VL
Warren	1.0	VL
Hudson	0.0	N
Salem	0.0	N

Average Net Change in Frequency

N = No Increase (0)

VL = Very Low Increase (1.0—2.4)

L = Low Increase (2.5 - 3.9)

M = Moderate Increase (4.0 - 5.4)

H = High Increase (5.5 - 6.9)

VH = Very High Increase (7.0+)

FIGURE A. PLAN versus TREND: Change in Frequency of Contact

County	Sum of Means	Pattern
Camden	9.0	VH
Passaic	8.5	VH
Sussex	8.5	VH
Cape May	6.5	H
Union	6.0	H
Bergen	5.0	M
Essex	5.0	M
Gloucester	5.0	M
Monmouth	5.0	M
Morris	5.0	M
Atlantic	4.0	L
Hunterdon	4.0	L
Warren	4.0	L
Mercer	3.0	L
Hudson	2.0	VL
Salem	2.0	VL
Burlington	1.0	VL
Cumberland	0.0	N
Middlesex	0.0	N
Ocean	0.0	N
Somerset	0.0	N

Average Net Change in Frequency

N = No Increase (0)

VL = Very Low Increase (1.0 - 2.5)

L = Low Increase (2.6 - 4.1)

M = Moderate Increase (4.2 - 5.7)

H = High Increase (5.8-7.3)

VH = Very High Increase (7.4+)

FIGURE B. PLAN versus TREND: Change in Frequency of Contact

Intergovernmental Coordination Calculations

The Intergovernmental Coordination Calculations are in "intergovernmental.xls", which stands by itself. The results of the Intergovernmental Coordination Survey were entered in sheet "Data Entry" and then selected information was copied to sheet "Calculations", rows 65 to 91. The Means of the various measures on sheet "Data Entry" were copied to rows 22 to 62 in sheet "Calculations" in order to generate Tables 54 and 55 of the impact assessment. Text labels relating to the frequency and quality of contacts were added. The data in rows 68 to 89, columns A to Y were read into an

SPSS run in order to calculate the Paired T-Test statistics for each of the comparisons, along with the significance of the relationship. The results of the analysis were copies into cells H8 to R20 and the means and relevant significance information was entered in Table 56 of the impact assessment.

The following is the SPSS syntax which was used:

```
GET DATA /TYPE=XLS
  /FILE='c:\intergovernmental.xls'
  /SHEET=name 'Sheet2'
  /CELLRANGE=range 'A68:Y89'
  /READNAMES=on .

T-TEST
  PAIRS = cocon cocoqn comunn comunqn costn costqn munmunn munmunqn
munstn munstqn  WITH cocop cocoqp comunp
 comunqp costp
  costqp munmunp munmunqp munstp munstqp (PAIRED)
  /CRITERIA = CI(.95)
  /MISSING = ANALYSIS.
```