HENRICO COUNTY
Vision 2026

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APPENDIX A: DEMAND ANALYSIS

POPULATION, HOUSING, EMPLOYMENT AND COMMERCIAL FLOOR AREA FORECASTS FOR THE PERIOD 2006-2026

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C L A R I O N

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General Note on Rounding:

Microsoft Excel was used in the calculation of the numbers presented in this document. Results are presented in whole numbers or rounded to two decimal places where appropriate, however, the analysis itself uses figures carried to their ultimate decimal places; therefore the sums and products generated in the analysis may not equal the sum or product if the reader replicates the calculations with the factors shown in the report.

Introduction

The quantity and distribution of population and jobs in the County will influence the potential land and service demands in Henrico County over the next two decades. A principal step in developing the 2026 Comprehensive Plan for Henrico County is the development of population, housing, employment and non-residential floor area forecasts for the planning period (2006-2026)[1].

There are many factors that will impact population and employment growth in the County, and there are several methods that can be used to estimate what the future population and employment demand may be. First, population and employment trends and forecasts are available from Woods and Poole Economics, Inc. (WP) which considers a number of economic and market forces in the development of forecasts. MDC also conducted alternate projections to establish the applicability of the WP projections and to offer alternate growth scenarios for review by the County. This report details three population growth trend scenarios and the possible implications of each. Employment forecasts, which are typically projected based upon correlations with population growth, are also provided. Two alternative methods for projection of employment and non-residential floor area demand are represented. A decision must be made about which alternative should be used in future analyses.

Population

In August of 2004, the county approved the estimated 2003 population of 281,069 in the *Continuing, Comprehensive and Coordinated Transportation Data Report* for the County. This was a 2.26% increase from 2002. This figure will serve as the base population for all analyses of future growth.

Several growth trends were examined to estimate the future population of Henrico County. The trend projections shown in the following table and chart illustrate possible growth scenarios for the County. Explanations of each scenario are included as footnotes to Table 1.

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[1] The official planning period is from anticipated adoption in 2006 to 2026 making it a 20 year plan. At the time of this analysis in late 2004 and early 2005 the population was verified for 2003 in the 2003 3-C's document, therefore data shown for 2004 and 2005 is also estimated.

TABLE 1: TREND PROJECTIONS

		1970*	1980	1990	2000	2010	2020	2030
1	Woods and Poole	155,570	180,735	217,881	263,400	305,160	352,820	403,680
2	Continued (1970-2000) Trend (1.8% per year)	154,364	180,735	217,881	263,400	314,831	379,668	454,980
3	Slowing Trend	154,364	180,735	217,881	263,400	314,831	349,942	372,389
4	Increased Trend (2.0% per year)	154,364	180,735	217,881	263,400	322,027	392,549	479,741
5	Regional Forecasts (2010 Plan)	154,000	180,735	217,881	239,000	261,000	282,000	284,200
6	Slowing Trend V2 over 20 years	154,364	180,735	217,881	263,400	318,685	368,316	410,812

NOTES FOR TABLE 1

1 The Woods and Poole projection is provided by Woods & Poole Economics, Inc. (WP). WP provides demographic projections for states and counties, updating them on an annual basis. The projections account for various market forces and other possible trends (migration, birth rates, etc.) that will affect growth within a jurisdiction. The annual Henrico County growth rates used by WP are:

Applied Growth Rates for Scenario 1

Decade	Average Annual Growth Rate
1970-1980	1.53%
1980-1990	1.90%
1990-2000	1.88%
2000-2010	1.49%
2010-2020	1.46%
2020-2030	1.36%

Source: Derived by MDC calculating average growth rate from given figures.

2 The "Continued Trend" of 1.8% growth per year is based upon recent growth trends in the County. Historically the County has grown at an average rate of about 1.77% (1970-2000). The last two decades the average has been slightly higher. If the growth rate in the County remained constant at 1.8% annually, this is the projection that would apply.

3 The "Slowing Trend" is based on the 1.8% average annual growth rate, but assumes that over the planning period the western portions of the County will reach build out and that as this happens growth in the County will begin to slow. It also assumes that the eastern portions of the County will not develop as rapidly as the western portions did. The average annual growth rates in this projection are reduced 25% every five years starting in 2004 as follows:

Applied Growth Rates for Scenario 3

5 Year Period	Average Annual Growth Rate
Period 1 (YR 04-08)	1.80%
Period 2 (YR 09-13)	1.35%
Period 3 (YR 14-18)	1.01%
Period 4 (YR 19-23)	0.76%
Period 5 (YR 24-28)	0.57%
Period 6 (YR 29-34)	0.43%

4 Like projection scenario 3, the "Increased Trend" of 2.0% growth per year utilizes a constant growth rate for the planning period, but assumes that there may be a slight increase in the annual growth rate over current and historic trends.

5 The "Regional Forecast" is provided to illustrate the projections used in the 2010 Land Use Plan. Considering the County's 2003 estimated population is over 281,000 the County has far surpassed the 2010 projection and is very near the 2020 projection.

6 The final trend is similar to the WP projections and the first "Slowing Trend", however this trend assumes growth will slow less quickly than projection scenario 3 at a rate of 10% of the original growth rate every 5 years. The applied growth rates for "Slowing Trend V2 Over 20 Years" are as follows:

Applied Growth Rates for Scenario 6

5 Year Period	Average Annual Growth Rate
Period 1 (YR 04-08)	1.80%
Period 2 (YR 09-13)	1.62%
Period 3 (YR 14-18)	1.44%
Period 4 (YR 19-23)	1.26%
Period 5 (YR 24-28)	1.08%
Period 6 (YR 29-34)	0.90%

* Several different populations were reported for 1970. Woods and Poole uses the U.S. Department of Commerce for historic population counts, and two Census counts for 1970 were reported. 154,364 from the Population of Counties Decennial Census: 1900 to 1990 Compiled by Richard L Forstall, Population Division US Bureau of the Census, and the County has records that indicate the 1970 population was 154,463. The regional forecasts from the 2010 Plan used the 1970 population rounded to 154,000.

The following chart illustrates the differences in the six scenarios. Confirmed historic growth is represented by a solid line, the various projected scenarios are illustrated as dashed lines.

Henrico County
Historic and Forecasted Population Growth
1970-2030
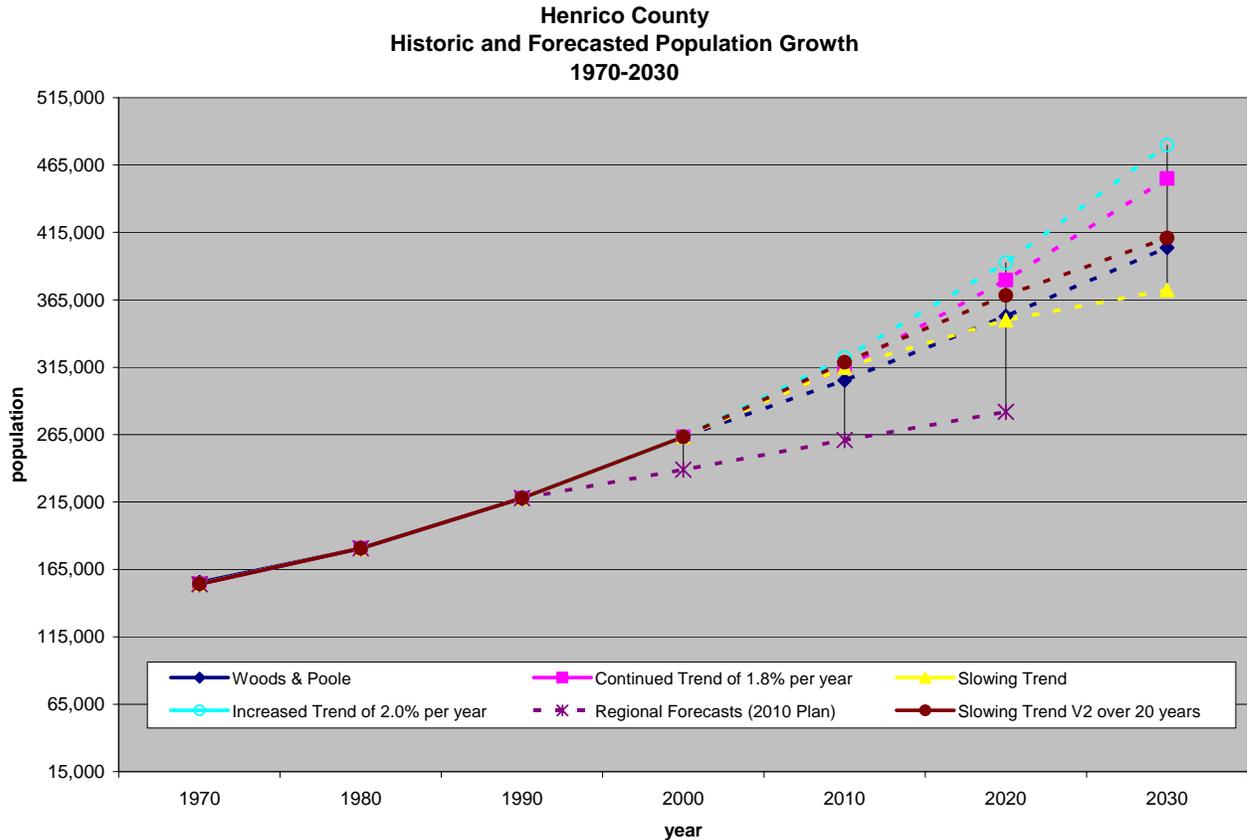
Source: Table 1

After review of the projection scenarios and discussion with County staff, MDC is using the "slowing trend version 2" (Scenario 6 in Table 1) as the population projection for all analyses for the **2026 Comprehensive Plan**. This scenario was selected from the six presented because of the potential that as the western portions of the County reach full build out that growth will continue into adjoining counties absorbing a percentage of the regional growth and reducing the rate at which Henrico's population will grow, as well as the reality that the physical conditions in the eastern portions of the County are different than those in the west and may prove a different set of challenges to development in the future that may also slow the rate of growth in the County. Table 2 shows the annual population estimates to 2030, based on the adjusted growth rates presented with projection scenario 6.

TABLE 2: RECOMMENDED POPULATION PROJECTIONS (ANNUAL)

1970	1980	1990	2000	2003[2]	2004	2005	2006
154,364	180,735	217,881	263,400	281,716	287,350	292,523	297,788

2007	2008	2009	2010	2011	2012	2013	2014
303,148	308,605	313,604	318,685	323,847	329,094	334,425	339,241

2015	2016	2017	2018	2019	2020	2021	2022
344,126	349,081	354,108	359,207	363,733	368,316	372,957	377,656

2023	2024	2025	2026	2027	2028	2029	2030
382,415	386,545	390,719	394,939	399,205	403,516	407,148	410,812

The Plan will be developed for a planning horizon year of 2026. The following table shows the population projections in five year increments beginning in 2006 (anticipated adoption of the plan). These projections, like those shown in Table 2 are based on an adjusted base year of 2003[2].

TABLE 3: RECOMMENDED POPULATION PROJECTIONS (FIVE YEAR INCREMENTS)

*2003	2003[2]	2004	2005	2006	2011	2016	2021	***2026
281,069	281,716	287,350	292,523	297,788	323,847	349,081	372,957	394,939

New Population Per Period								
	2004	2005	2006	2011	2016	2021	**2026	2003-2026
New Population	5,634	5,173	5,265	26,059	25,234	23,876	21,982	113,223

NOTES FOR TABLE 3
* Accepted 2003 3-C's estimated population
** 2026 Planning Horizon year.

The projections shown in Table 3 will be utilized in the following Housing Demand and Employment Forecasts.

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[2] The 2003 population estimate illustrated here is adjusted to account for various sized households in single and multifamily households. The 3-C's Report applied a consistent average household size of 2.39 persons per household to both the single-family housing units and the multi-family housing units to generate the adopted 3C's 2003 population of 281,069. This 2.39 persons per household average household size is the average reported in the 2000 decennial census based on various household sizes for various household types and is driven by the ratio of multi-family to single-family household in 2000. Based on estimates made by Woods and Poole household sizes are changing, and the ratio of single family to multifamily households has changed from 2000 to 2003, making the 2.39 average household size an inaccurate average for the county in 2003. When multi-family households and single-family households were calculated at different average household sizes based on estimates by Woods and Poole for consistent projections in this analysis (see tables 6, 7,and 8) a discrepancy in the 2003 population was created. The adjustment of the 2003 population from 281,069 to 281,716 will allow for consistent application of various households sizes in the multiple models that will be run using these population projections which will account for the various impacts of different housing types. Additional information on this topic is provided in the Housing Demand section of this document.

Housing Demand

The demand for new housing units in Henrico County is dependent on the estimated population growth in the future. This analysis assesses the number of single-family and multi-family housing units that may be "demanded" in the future based on the projected population growth illustrated in the previous section.

According to the population and housing unit estimates in the 2003 3-Cs report, approximately 1.96% of the County's population is living in Group Quarters (i.e. nursing homes, dormitories, special care housing, etc), and the remaining 98.04% of the population is living in households. Over the planning period it is possible that an increasing percentage or number of county residents will demand alternative housing options. A large portion of the national population (the baby boomer generation) will reach retirement age in the planning period. Because this is a demand based on age it is more difficult to project what the housing impacts will be or how the county should prepare for the needs of an aging population. This is a policy issue that should be discussed. For the purpose of this analysis it is assumed that the percentages will remain constant over the planning period to 2026. Table 4 shows the projections of the number of persons in Group Quarters and Households based on the estimated population forecasts to 2026.

TABLE 4: HOUSEHOLD AND GROUP QUARTER POPULATION PROJECTIONS

	*2003	**2003 (Adjusted)	2004	2005	2006	2011	2016	2021	***2026
Total Population	281,069	281,716	287,350	292,523	297,788	323,847	349,081	372,957	394,939
Pop. in Group Quarters (1.96%)[1]	5,515	5,515****	5,632	5,733	5,837	6,347	6,842	7,310	7,741
Pop. in Households (98.04%)[2]	275,560	276,201	281,718	286,790	291,951	317,500	342,239	365,647	387,198

NOTES FOR TABLE 4

* Accepted 2003 3-C's estimated population

** Adjusted 2003 estimated population based on various household sizes for single family and multi family households.

*** 2026 Planning Horizon year.

****Not adjusted actual count not based on household size.

1. Population in Group Quarters is assumed to be constant at 1.96% (rounded) of the total County Population, based on 2003 estimates. 3-Cs Report.
2. 98.04% (rounded) of the total population is assumed to live in households, based on 2003 estimates. 3-Cs Report.

The population in Households can be further broken down to show the number of people who will likely live in single-family homes versus multi-family homes[3]. Current estimates based on the adjusted

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[3] Single-family homes include all detached single family housing units and mobile homes. Multi-family homes include all attached housing, 2-family, townhouses, apartments, and condos and include owner and renter occupied.

2003 population, show that approximately 73% of the population living in households is living in single-family detached housing, and the other 27% of the household population is living in multi-family attached housing. For the purpose of this analysis it is assumed this trend will remain constant over the planning period, however it is a policy decision for the County wheter there is a goal to maintain a specific percentage of multi-family housing over the planning period, which may influence the percentage of the population in multi-family vs. single-family homes.   Table 5 shows the breakdown of household population into the type of household by single-family and multi-family.

TABLE 5: HOUSEHOLD POPULATION BY HOUSING TYPE

	2003^2	2003^2 (Adjusted)	2004	2005	2006	2011	2016	2021	**2026
Pop. In Households	*275,560*	*276,201*	*281,718*	*286,790*	*291,951*	*317,500*	*342,239*	*365,647*	*387,198*
Single-Family Pop. (73%)	183,468	203,427	205,654	209,356	213,124	231,775	249,834	266,922	282,655
Multi-Family Pop. (27%)	92,085	72,774	76,064	77,433	78,827	85,725	92,405	98,725	104,544

NOTES FOR TABLE 5

1.Using a 2.39 consistent persons per household allocates 66.% of the population to single family and 34% to multi-family (the same as the break down of households see table 7)

2.The 2003 Adjusted Population in Households is created by applying the various household sizes from table 7 to the inventory of household in 2003. The 3-C's report uses a constant household size of 2.39 persons for all households. Households were used to generate population by type (single-family, single-family attached, and multi-family) at different sized households, which average out to be 2.39 persons per household . This figure is included to remain consistent in all model projections which require households to be broken down by type. In this case it is the number of households which generates the population, in future projections it is population which generates the households accounting for variations in percentages. See table A in the Appendix.

The housing unit demand can be calculated by applying average household sizes to the population living in households of each type. At the 2000 Census, the average household size in Henrico County was reported at 2.39 persons per household.   Local and national projections show a decrease in the average household size based on aging population and general changes in family structure.   The forecasts for average household size over the planning period were available from WP.   However, these numbers were reduced starting in 2001 from the 2000 Census numbers.   Because

TABLE 6: AVERAGE HOUSEHOLD SIZE COMPARISON

	2000	2001	2003	2004	2005
3-Cs report	2.39	2.39	2.39	2.39	NA
Woods and Poole	2.39	2.38	NA	2.36	2.35
*MDC Suggested (All)	2.39	2.39	2.39	2.39	2.37

	2006	2011	2016	2021	2026
3-Cs report	NA	NA	NA	NA	NA
Woods and Poole	2.35	2.33	2.31	2.31	2.33
*MDC Suggested (All)	2.37	2.35	2.33	2.33	2.35

NOTES FOR TABLE 6

*To account for fluctuating household sizes over the planning period MDC adjusted household sizes from 2.39 in 2004 to adjust at a rate similar to that estimated by Woods and Poole.

Henrico County has assumed a constant average household size of 2.39 persons per household to calculate the estimated 2003 population the future household sizes must be adjusted to account for

this. Table 6 illustrates the WP household sizes and the MDC recommended average household sizes for the planning period.

The difference in household sizes between single-family and multi-family households will play an important role in the calculations in models and in estimations and projections of service provision. Woods and Poole does not provide a breakdown of average household sizes by household type.

Because Henrico County has continued to assume that the average household size in the County is the same as it was at the time of the 2000 Census, it is reasonable to assume the Census numbers can also be applied to the average household size by housing type. Table 7 shows the average household sizes reported in the 2000 Census. If we assume the general mix (ratio) of housing types remains constant in the County over the planning period the demand for various types of housing can be determined by applying the average household sizes to the single and multifamily household populations respectively and adjusting the single-family and multi-family average household sizes in conjunction with the overall average household size. Table 8 shows the forecasted household sizes by housing type for the planning period based on the MDC recommended average household sizes illustrated in Table 6.

TABLE 7: AVERAGE HOUSEHOLD SIZE 2000

	Persons per Household	Percent of Households
Single-Family Detached*	2.65	66%
Multi-Family (All)**	1.89	34%
Single-Family Attached	*1.98*	*7%*
Multi-Family/Other	*1.87*	*27%*

NOTES FOR TABLE 7

* Detached plus mobile homes

** All Multi-Family Households-This category can be broken down in to Single-family attached and Multi-family/Other.

Source: 2000 Census, Summary File 3.

TABLE 8: FORECASTED AVERAGE HOUSEHOLD SIZES BY HOUSING TYPE (PERSONS PER HH)

	2000	2003	2004	2005	2006	2011	2016	2021	2026
MDC Suggested (All Households)	*2.39*	*2.39*	*2.39*	*2.37*	*2.37*	*2.35*	*2.33*	*2.33*	*2.35*
Single-Family Detached	2.64	2.65	2.65	2.63	2.63	2.61	2.58	2.58	2.61
Single-Family Attached	1.98	1.98	1.98	1.96	1.96	1.95	1.93	1.93	1.95
Multi-Family/Other	1.87	1.87	1.87	1.85	1.85	1.84	1.82	1.82	1.84
SFA and MF Average (All Non-Single Family)	1.89	1.89	1.89	1.88	1.88	1.86	1.85	1.85	1.86

Applying the average household sizes associated with the single-family detached and multi-family[4] housing types to the forecasted single-family and multi-family populations illustrated in Table 5 yields the number of single-family and multi-family households that may be demanded in the County by 2026. Table 9 shows these forecasts in five year increments starting in 2006.

TABLE 9: FORECASTED HOUSEHOLDS

	2003 (Adjusted)	2004	2005	2006	2011	2016	2021	2026
Total Population In Households	*276,201*	*281,718*	*286,790*	*291,951*	*317,500*	*342,239*	*365,647*	*387,198*
Single-Family Population	203,427	205,654	209,356	213,124	231,775	249,834	266,922	282,655
Persons Per Single-Family Household	2.65	2.65	2.63	2.63	2.61	2.58	2.58	2.61
Single-Family Households	76,765	77,605	79,603	81,036	88,803	96,835	103,458	108,297
Multi-Family Population	72,774	76,064	77,433	78,827	85,725	92,405	98,725	104,544
Persons per Multi-Family Household	1.89	1.89	1.88	1.88	1.86	1.85	1.85	1.86
Multi-Family Households	38,505	40,245	41,188	41,929	46,089	49,948	53,365	56,206
Total Households	*115,270*	*117,851*	*120,791*	*122,965*	*134,891*	*146,783*	*156,823*	*164,503*

To translate the number of households into a number of housing units that may be constructed, it is necessary to assume that some portion of the housing stock is vacant, and the households account for the occupied housing units. Like household sizes, the vacancy rates for single-family housing and multi-family housing vary from one another. If we assume the current vacancy rates estimated in 2003 apply consistently over time, then 1.42% of all single family housing units and 7.14% of the multi-family housing units will be vacant. Table 10 shows the calculations for the number of forecasted housing units by type for the planning period.

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[4] All non single-family households average. See table 8.

TABLE 10: FORECASTED HOUSING UNITS

	2003[1]	2004	2005	2006	2011	2016	2021	**2026
Single-Family Households (occupied units)	76,765	77,605	79,603	81,036	88,803	96,835	103,458	108,297
Single-Family Units (vacant units)	1,090	1,102	1,130	1,151	1,261	1,375	1,469	1,538
Single-Family Units	*77,855*	*78,707*	*80,733*	*82,187*	*90,063*	*98,210*	*104,927*	*109,834*
Multi-Family HH (occupied units)	38,505	40,189	41,258	42,000	46,811	50,801	54,180	56,784
Multi-Family (Vacant)	2,747	2,868	2,944	2,997	3,340	3,625	3,866	4,052
Multi-Family Units	*41,252*	*43,057*	*44,202*	*44,997*	*50,151*	*54,426*	*58,046*	*60,836*
Total Households (occupied units)	115,270	117,794	120,861	123,036	135,614	147,636	157,638	165,081
Total Vacant Units	3,837	3,969	4,074	4,147	4,601	5,000	5,335	5,589
Total Housing Units	***119,107***	***121,764***	***124,935***	***127,183***	***140,215***	***152,636***	***162,973***	***170,670***

NOTES FOR TABLE 10

1. 2003 units are estimated based on inventory of building records from the County

POPULATION AND HOUSING DEMAND SUMMARY

Based on these projections it is anticipated that the population will increase by approximately 113,223 people by 2026, increasing the County's population by more than forty percent from the 2003 3-C's estimates. With this growth in the population it is also anticipated that there will be demand for approximately 51,563 new housing units bringing the County total to 170,670 housing units. Single-family housing units are expected to increase by 31,979 units and multi-family will grow by approximately 19,584 units. Table 11 shows the anticipated new growth in both population and housing.

TABLE 11: FORECASTED NEW POPULATION AND HOUSING UNITS

	2003	2003*	2004	2005	2006	2011	2016	2021	**2026
Population (Total)	281,069	281,716	287,350	292,523	297,788	323,847	349,081	372,957	394,939
Single Family Units (Total)	77,855	77,855	78,707	80,733	82,187	90,063	98,210	104,927	109,834
Multi-Family Units (Total)	41,252	41,252	43,057	44,202	44,997	50,151	54,426	58,046	60,836
Total Housing Units(Total)	*119,107*	*119,107*	*121,764*	*124,935*	*127,183*	*140,215*	*152,636*	*162,973*	*170,670*

	2003*-2004	2004-2005	2005-2006	2006-2011	2011-2016	2016-2021	2021-**2026	2003-2026
Population (New)	5,634	5,173	5,265	26,059	25,234	23,876	21,982	113,223
Single Family Units (New)	852	2,026	1,453	7,877	8,147	6,717	4,907	31,979
Multi-Family Units (New)	1,805	1,145	795	5,154	4,275	3,620	2,790	19,584
Total Housing Units(New)	*2,657*	*3,172*	*2,248*	*13,031*	*12,421*	*10,337*	*7,697*	*51,563*

Source: Tables 3 and 10.

Employment Forecasts

There are two primary concerns when forecasting Employment for the County: a) the number of jobs in each employment sector, and b) the building floor area that will be needed to accommodate future employment[5]. Employment forecasts are available from WP. However, they must be adjusted based on the revised population forecasts. Table 12 shows the WP forecasts for employment by sector and the ratio of jobs to the WP population estimates for the same year.

TABLE 12: WOODS AND POOLE EMPLOYMENT FORECASTS AND RATIO TO POPULATION BY SECTOR

	2000	2001	2004	2005	2010	2015	2020	2025	2030
Total Employment (thousands)	*194.77*	*199.71*	*213.26*	*217.62*	*238.35*	*258.33*	*277.50*	*295.64*	*312.53*
					(Thousands)				
Farm Employment	0.21	0.21	0.21	0.21	0.20	0.19	0.19	0.18	0.18
Agricultural Services	1.35	1.48	1.50	1.51	1.56	1.63	1.71	1.80	1.92
Mining	0.19	0.18	0.19	0.19	0.22	0.24	0.26	0.28	0.29
Construction	12.09	12.90	13.82	14.01	14.71	15.35	15.97	16.56	17.11
Manufacturing	16.51	16.85	17.81	18.11	19.52	20.72	21.67	22.38	22.83
T/C/PU	8.81	9.12	10.35	10.73	12.48	14.09	15.60	17.05	18.45
Wholesale Trade	11.76	11.72	12.01	12.10	12.50	12.86	13.19	13.51	13.86
Retail Trade	38.27	38.52	39.48	39.83	41.41	42.78	43.89	44.72	45.24
F.I.R.E.	32.40	34.64	37.12	37.93	41.65	45.13	48.44	51.57	54.51
Services	59.02	59.67	65.85	67.92	78.33	88.96	99.67	110.24	120.46
Federal Civilian Govt	0.80	0.58	0.60	0.61	0.65	0.69	0.72	0.76	0.79
Federal Military Govt	0.98	1.00	1.01	1.02	1.04	1.05	1.06	1.07	1.07
State and Local Govt	12.38	12.84	13.31	13.45	14.08	14.64	15.13	15.52	15.82
Total Population (thousands)	**263.33**	**265.96**	**277.56**	**282.22**	**305.16**	**328.74**	**352.82**	**377.61**	**403.68**
					(Number of jobs per capita)				
Total Employment	*0.7397*	*0.7509*	*0.7683*	*0.7711*	*0.7810*	*0.7858*	*0.7865*	*0.7830*	*0.7742*
Farm Employment	0.0008	0.0008	0.0008	0.0007	0.0007	0.0006	0.0005	0.0005	0.0004
Agricultural Services	0.0051	0.0056	0.0054	0.0054	0.0051	0.0050	0.0048	0.0048	0.0048
Mining	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007	0.0007
Construction	0.0459	0.0485	0.0498	0.0496	0.0482	0.0467	0.0453	0.0439	0.0424
Manufacturing	0.0627	0.0634	0.0642	0.0642	0.0640	0.0630	0.0614	0.0593	0.0566
T/C/PU	0.0335	0.0343	0.0373	0.0380	0.0409	0.0429	0.0442	0.0452	0.0457
Wholesale Trade	0.0447	0.0441	0.0433	0.0429	0.0410	0.0391	0.0374	0.0358	0.0343
Retail Trade	0.1453	0.1448	0.1422	0.1411	0.1357	0.1301	0.1244	0.1184	0.1121
F.I.R.E.	0.1230	0.1302	0.1337	0.1344	0.1365	0.1373	0.1373	0.1366	0.1350
Services	0.2241	0.2244	0.2372	0.2407	0.2567	0.2706	0.2825	0.2919	0.2984
Federal Civilian Govt	0.0030	0.0022	0.0022	0.0022	0.0021	0.0021	0.0020	0.0020	0.0020
Federal Military Govt	0.0037	0.0038	0.0036	0.0036	0.0034	0.0032	0.0030	0.0028	0.0027
State and Local Govt	0.0470	0.0483	0.0480	0.0477	0.0461	0.0445	0.0429	0.0411	0.0392

Source: Woods and Poole Economics Inc. 2004.
- T/C/PU-Transportation Communication, Public Utilities
- FIRE-Finance, Insurance, Real Estate

The ratios established above were advanced one year to fit the five year periods used in the population projections and applied to the population estimates for the planning period to establish the number of forecasted jobs in each sector based on the MDC recommended population forecasts. Table 12 illustrates the estimated employment by sector for the planning period.

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[5] Translates into the number of acres demanded for non-residential uses for application in the future land use scenarios.

TABLE 13: ESTIMATED EMPLOYMENT BY SECTOR

	2001	2004	2005	2006	2011	2016	2021	2026	2030
					(Thousands)				
Total Employment (thousands)	*197.74*	*220.78*	*225.58*	*229.64*	*252.94*	*274.29*	*293.33*	*309.22*	*318.05*
Farm Employment	0.21	0.22	0.22	0.22	0.21	0.20	0.20	0.19	0.18
Agricultural Services	1.47	1.55	1.57	1.59	1.66	1.73	1.81	1.88	1.95
Mining	0.18	0.20	0.20	0.20	0.23	0.25	0.27	0.29	0.30
Construction	12.77	14.31	14.52	14.78	15.61	16.30	16.88	17.32	17.41
Manufacturing	16.68	18.44	18.77	19.11	20.72	22.00	22.91	23.41	23.23
T/C/PU	9.03	10.72	11.12	11.32	13.24	14.96	16.49	17.83	18.78
Wholesale Trade	11.60	12.43	12.54	12.77	13.27	13.66	13.94	14.13	14.10
Retail Trade	38.14	40.87	41.28	42.03	43.95	45.43	46.39	46.77	46.04
Fire	34.30	38.43	39.31	40.02	44.20	47.92	51.20	53.94	55.47
Services	59.08	68.17	70.40	71.67	83.13	94.46	105.36	115.30	122.59
Federal Civilian Govt	0.57	0.62	0.63	0.64	0.69	0.73	0.76	0.79	0.80
Federal Military Govt	0.99	1.05	1.06	1.08	1.10	1.11	1.12	1.12	1.09
State and Local Govt	12.71	13.78	13.94	14.19	14.94	15.55	15.99	16.23	16.10
Total Population (thousands)	*263.33*	*287.35*	*292.52*	*297.79*	*323.85*	*349.08*	*372.96*	*394.94*	*410.81*

Source: Applied established ratios from Table 11 to population estimates from Table 3.
- T/C/PU-Transportation Communication, Public Utilities
- FIRE-Finance, Insurance, Real Estate

The economic census of 1997 is the nearest reference for employment in Henrico County. Woods and Poole has projected this information in 2000 so the data for 2000 was used as a base reference. From the historic estimate of 194,790 jobs in the County in 2000[6] it is estimated that an additional 120,310 jobs will be created in the County between 2001 and 2026. This represents a 60% forecasted increase from 2001 estimates.

Non-Residential Floor Area Demand

FLOOR AREA DEMAND SCENARIO 1

These employment figures can be multiplied by an established ratio of employee to floor area to translate them into area of building square footage necessary to accommodate the employment growth. The first approach outlined below uses the ratio of floor area to employee derived by MDC when the estimated number of employees for 2000 was applied to the estimated floor area of non-residential buildings reported in 2000. To do this, MDC estimated the percentage of jobs in each employment sector that would be dedicated to a specific non-residential land use category. Table 14 shows the percentages which were used.

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[6] See table 12.

TABLE 14: PERCENTAGE OF EMPLOYMENT BY SECTOR IN EACH LAND USE CATEGORY

	Retail	Office	Industrial	Non Locational*	Total
Agricultural Services/Farming				100%	100%
Mining		15%	85%		100%
Construction		20%	20%	60%	100%
Manufacturing		10%	90%		100%
T/C/PU		80%	20%		100%
Wholesale	5%	10%	85%		100%
Retail	85%	10%	5%		100%
FIRE	25%	75%			100%
Services	35%	60%	5%		100%
Government (All)**		100%			100%

NOTES FOR TABLE 13

Source: McBride Dale Clarion, estimates of percentage distribution by sector.

*Note: Some sectors have employment that is not tied to a specific land use. Data here is represented as Non-locational employment.

** For this analysis it is assumed that all government employment sectors have similar land use allocations.

- T/C/PU-Transportation Communication, Public Utilities
- FIRE-Finance, Insurance, Real Estate

Table 15 shows the breakdown of the estimated 2000 employment figures by applying the percentages presented in Table 14.

TABLE 15: 2000 EMPLOYMENT BREAKDOWN BY LAND USE CATEGORY

	2000 Jobs by Sector	Non Locational Jobs	Commercial/Retail Jobs	Office Jobs	Industrial Jobs
Total Employment (thousands)	194,790				
Farm Employment	210	210	-	-	-
Agricultural Services	1,350	1,350	-	-	-
Mining	190	-	-	29	162
Construction	12,090	7,254	-	2,418	2,418
Manufacturing	16,510	-	-	1,651	14,859
T/C/PU	8,810	-	-	7,048	1,762
Wholesale Trade	11,760	-	588	1,176	9,996
Retail Trade	38,270	-	32,530	3,827	1,914
F.I.R.E.	32,400	-	8,100	24,300	-
Services	59,020	-	20,657	35,412	2,951
*Government (All Divisions)	14,160	-	-	14,160	-
		8,814	*61,875*	*90,021*	*34,061*

Total Population (thousands)	263,330	

Source: U.S. Department of Commerce (USDoC)-Percentages estimated by MDC

*A percentage of the local government employment is housed in Schools which may or may not be separated for analysis.

- T/C/PU-Transportation Communication, Public Utilities

FIRE-Finance, Insurance, Real Estate

In 2000, the Henrico County Computer Assisted Mass Appraisal estimated approximately 78.4 million square feet of non-residential building area in the County. The building area is illustrated in Table 16 by land use. The employment numbers from Table 15 were applied to this building area and yield a ratio of floor area per employee by category, which is shown below as *Derived Square Feet per Employee.*

TABLE 16: FLOOR AREA PER EMPLOYEE (2000)

Employment/Land Use Category	2000 Building Area (million square feet)	2000 Employees	Derived Square Feet per Employee
Commercial/Retail	23,983,510	61,875	388
Office	29,679,791	90,021	330
Industrial	24,824,961	34,061	729
NOTES FOR TABLE 16			

Derived Square Feet is rounded in this table to a whole number. When applied in excel the square feet divided by the number of employees was carried to its infinite decimal place.

MDC applied the categorical break down illustrated in Table 15 to the projected employment figures shown in Table 13 and established the number of employees in each Employment/Land Use Category for each period. Table 17 shows the forecasted employment figures based on this analysis.

TABLE 17: FORECASTED EMPLOYMENT BY EMPLOYMENT/LAND USE CATEGORY

	2000	2006	2011	2016	2021	2026
Non Locational Employees	8,814	10,685	11,234	11,712	12,137	12,463
Commercial/Retail Employees	61,875	72,008	78,162	84,997	90,510	94,302
Office Employees	90,021	107,182	121,307	131,936	142,854	153,983
Industrial Employees	34,061	39,924	42,243	45,787	47,920	48,460
Total Employees	*194,770*	*229,798*	*252,946*	*274,433*	*293,421*	*309,207*

MDC multiplied the number of employees shown in Table 17 by the Derived Square Feet per Employee to estimate the approximate area of non residential floor area that may be demanded. Table 18 shows these estimates.

TABLE 18: ESTIMATED NON-RESIDENTIAL FLOOR AREA DEMAND-SCENARIO 1

	2000	2006	2011	2016	2021	2026
Commercial/Retail Sq. Feet	23,983,510	27,695,252	30,296,671	32,691,074	34,811,575	36,552,808
Office Sq. Feet	29,679,791	35,727,350	39,995,066	43,978,785	47,617,989	50,768,220
Industrial Sq. Feet	24,824,961	28,516,881	30,787,972	32,704,972	34,228,560	35,319,360
Total Sq. Feet	*78,488,262*	*91,939,484*	*101,079,709*	*109,374,831*	*116,658,123*	*122,640,388*

FLOOR AREA DEMAND SCENARIO 2

Another alternative for calculating future non-residential floor area demand is to use the assumption that the County will gain approximately 2 million square feet of non-residential floor area per year. This assumption was used in the recent Cash Proffer Study and is based on recent trends reported by the County. Table 20 illustrates the estimated floor area in each category based on the increase of 2 million square feet of floor area per year, if current ratios are maintained. Table 19 shows the 2000 derived percentage of total floor area dedicated to each category.

TABLE 19: 2000 PERCENTAGE OF TOTAL NON RESIDENTIAL FLOOR AREA BY LAND USE CATEGORY

	Square Feet	Percentage
Commercial/Retail	23,983,510	30.56%
Office	29,679,791	37.81%
Industrial	24,824,961	31.63%
Total	*78,488,262*	100%

TABLE 20: ESTIMATED NON-RESIDENTIAL FLOOR AREA DEMAND-SCENARIO 2

	2000	2006	2011	2016	2021	2026
Commercial/Retail Sq. Feet	23,983,510	27,650,327	30,706,008	33,761,690	36,817,371	39,873,052
Office Sq. Feet	29,679,791	34,217,508	37,998,938	41,780,369	45,561,799	49,343,230
Industrial Sq. Feet	24,824,961	28,620,427	31,783,315	34,946,204	38,109,092	41,271,980
Total Sq. Feet	*78,488,262*	90,488,262	100,488,262	110,488,262	120,488,262	130,488,262

The forecasts in Scenario 2 suggest a higher rate of growth for non-residential uses than projected by Woods and Poole. WP shows that employment growth will slow with the growth in the population, where as Scenario 2 below assumes that employment growth will remain constant over the planning period. As with population projections the employment growth may be affected by potential build out in the western portions of the county.

Neither of these scenarios has been chosen to use in other analyses for the Comprehensive Plan. Further discussion and decisions will need to be made for the basis for future planning. Because there is enough of a difference in the projections it may be decided to create a range of demand for non-residential floor area.

Conclusion

The population, housing, employment, and non-residential floor area forecasts presented in this document are representative of possible future demand for growth in Henrico County. For the purpose of subsequent analysis relating to the Comprehensive Plan the chosen forecasts will remain constant. How the County chooses to accommodate/address this growth will determine the land resources that will be needed. Alternative development scenarios will be explored in the Capacity Analysis to identify the most appropriate development densities and location to meet the County's goals for service provision and land use efficiency.