Appendix C

Charles County Comprehensive Plan

Land Use Market Supply and Demand Analysis

Technical Memorandum

Prepared for Charles County, Maryland

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July 2011

(minor updates included, 2016)

Table of Contents

List of Tables

List of Figures

Summary

This technical memorandum summarizes background research into the demand for and supply of land in Charles County to satisfy projected population, housing, and employment growth through 2040. These analyses were conducted as part of the 2012 Charles County Comprehensive Plan, and comprise two related investigations. The first investigation, conducted by the Center for Regional Analysis (CRA), involves forecasting the market-driven demand for land needed to accommodate future job and household growth in Charles County, Maryland to 2040. This analysis is included in Section 1. The second investigation combines the CRA analysis with ERM's analysis of land that is planned or potentially available for future residential and nonresidential development. This analysis is included in Section 2.

Both analyses evaluate "base case" conditions, using existing land use, zoning, and other development policies based on the 2006 Comprehensive Plan. Table 1 summarizes the key commercial demand and supply information from Sections 1, while Table 2 summarizes residential information from Section 2. The 2012 Comprehensive Plan process is exploring alternative land use scenarios. The data in this memorandum provides a baseline against which the differing land use supply and demand impacts of these scenarios can be measured.

Table 1. Summary of 2040 Demand and Supply for Commercial/Employment Land

Commercial/Employment (all figures in Acres)	Demand[1]	2,773
	Supply	6,807
	Net Supply	**4,034**

Notes:

1: Source: CRA (see Section 1)

Table 2. Summary of 2040 Demand and Supply for Residential Dwelling Units/Acreage

	Dwelling Units[1]	Acres[1]
1. Residential Demand	33,208	35,928
2. "Committed" Units/Land[2]	24,198	22,383
3. Remaining Demand (1 minus 2)	**8,010**	**13,545**
4. Other Developable Units/Land[3]	29,898	113,030
5. Net Residential Supply (4 minus 3)	**21,888**	**99,485**

Notes:

1: Source: CRA (see Section 1)

2: "Committed" means land for which a preliminary subdivision plan (or subsequent plan or plat) has been submitted to the Department of Planning and Growth Management (see Section 2). Note that there are 30,926 total Committed units. This total is discounted by approximately 20 percent to reflect the number of these units that are expected to be built by 2040.

3: Includes residentially-zoned land shown as "Undeveloped/Developable" on the Land Use/ Land Cover Status Map, presented at the Regional Visioning Sessions in 2011. Potential dwelling units are calculated based on acreage and assumed development yields at base density.

Section 1. Land Use Market Demand Analysis

Introduction

The Center for Regional Analysis (CRA), as a subconsultant to Environmental Resources Management, Inc. (ERM), was tasked with forecasting the market-driven demand for land needed to accommodate future job and household growth in Charles County, Maryland to 2040. These land demand forecasts will be inputs to the 2012 Comprehensive Plan, specifically providing guidance as to whether or not the county currently has sufficient amounts of properly-zoned land for expected commercial and residential development.

Table 1-1 summarizes CRA's findings. Overall, this analysis found that there will be a demand for 2,773 additional acres for future commercial development and 35,928 acres for future residential development. The county's comprehensive planning efforts should take into account whether or not there is sufficient land to meet this demand.

Table 1-1. Summary of Land Use Demand Analysis
Demand for Land to Accommodate Commercial/Employment and Residential Development to 2040

Land Use	Supply, 2010 (Acres)	Demand, 2040 (Acres)	Net Change, 2010-40 (Acres)	Net Change, 2010-40 (Percent)
Commercial/Employment				
Office	7,853	9,196	1,343	13.6%
Retail	2,967	3,403	436	14.7%
Industrial	2,180	3,174	994	45.6%
Total Com/Emp	**13,000**	**15,773**	**2,773**	**19.2%**
Residential				
Rural	18,727	28,459	9,732	52.0%
Low Density	33,328	50,698	17,370	52.0%
Med/High Density	10,273	19,170	8,897	86.4%
Total Residential	**62,328**	**98,256**	**35,928**	**57.6%**

These land use forecasts are based on econometric models of future job growth by sector produced by Global Insight and forecasts of jobs and households prepared by the Maryland Department of Planning and the Metropolitan Washington Council of Governments.

The land use demand forecasts are based on the assumption that the intensity of future development in Charles County will not differ significantly from current development patterns. If the County plans for development at higher intensities, then less land will be required. ***Therefore, these land use demand forecasts should be treated as an upper bound of the amount of land needed to accommodate future growth.***

The following technical memo describes in detail the analysis undertaken by CRA to produce the land use demand forecasts.

Charles County and the Greater Washington Region

Washington Metropolitan Area Growth

The land use demand forecasts quantify the commercial and residential development needed to accommodate future job and population/household growth in the County. The future growth of Charles County depends critically on growth in the overall Greater Washington area. Charles County has historically accounted for a relatively small share of the region's household growth and an even smaller

share of its job growth. As a result of the County's location in the region—and the presence of many other highly attractive high growth areas within the region—the County will continue to attract relatively small shares of region job and household growth over the next 30 years.

According to Metropolitan Washington Council of Government's (COG) most recent forecasts of employment, households and population (Round 8), the Washington DC Metropolitan Area[1] is expected to gain 1.35 million net new jobs and 758,000 households over the 30-year period from 2010 through 2040. Regionally, job growth is expected to be faster than population growth over the next 30 years.

Jobs

Over the past two decades, Northern Virginia has accounted for a disproportionate share of job growth in the region, a trend that is expected to continue. Between 2010 and 2040, over 55 percent of the job growth in the Washington DC Metropolitan area will be in Northern Virginia. Nearly 30 percent of the region's job growth will occur in Suburban Maryland and about 14 percent will be in the District of Columbia. Northern Virginia will attract the majority of the region's job growth for several reasons, including the expansion of Metrorail to Dulles Airport, improvements and the addition of HOT and HOV lanes along I-495 and I-395, redevelopment efforts in Tyson's Corner and along the Dulles Corridor, and the presence of large, long-established Federal government contractors. In Suburban Maryland, Montgomery County will account for the greatest share of job growth, though Prince George's County will become an increasingly attractive location for jobs. Only five percent of the region's job growth between 2010 and 2020 will be in Prince George's County. However, between 2030 and 2040, 15 percent of the region's job growth is forecasted to take place in Prince George's County.

Households

The Washington DC Metropolitan Area will add nearly 758,000 new households between 2010 and 2040. About 53 percent of the household growth will be in Northern Virginia, 34 percent will be in Suburban Maryland and 10 percent will be in the District of Columbia. Northern Virginia's share of household growth will fall over that time period, while Suburban Maryland's will increase. Frederick County, Maryland will experience an increase in its share of regional household growth over the period. In general, household growth pushes to the more suburban jurisdictions over the forecast period. In Northern Virginia, the outer jurisdictions—Fauquier, Spotsylvania and Stafford counties—will experience greater growth in households later in the forecast period.

Charles County's Role in the Region

In 2010, Charles County had about 61,500 jobs and 51,000 households (55,000 housing units). The County's economy is primarily a residential-based economy, with the largest number of jobs in the retail trade and government (primarily state/local) sectors. About one-third of the County's residents work in the County, while 30 percent work elsewhere in Maryland and about 35 percent work in the District of Columbia and Northern Virginia.[2] County and regional job and household projections are shown in Table 1-2. Over the next three decades, Charles County is forecasting a gain of 20,900 new jobs and 30,000 households.

[1] The definition of the Washington Metropolitan Area includes 22 counties and cities: Washington DC; Montgomery, Prince George's, Frederick, Charles and Calvert counties in Maryland; Arlington, Fairfax, Prince William, Loudoun, Fauquier, Spotsylvania, Stafford, Warren and Clarke counties and the cities of Alexandria, Fairfax, Falls Church, Fredericksburg, Manassas and Manassas Park in Virginia; and Jefferson County, West Virginia. The COG area does not include Warren County, Virginia. Therefore, all COG forecasts for the Washington Metropolitan Area exclude Warren County.

[2] Estimates from the 2009 U.S. Census Bureau American Community Survey

Table 1-2. Forecasts of Job and Household: 2010 - 2040

Jobs	**2010-2020**	**2020-2030**	**2030-2040**	**2010-2040**
Washington Metro Area	531,407	445,527	368,164	1,345,098
Charles County	9,496	5,804	5,598	20,898
County's share of regional growth (%)	1.8	1.3	1.5	1.6
Households	**2010-2020**	**2020-2030**	**2030-2040**	**2010-2040**
Washington Metro Area	295,781	258,401	198,777	752,959
Charles County	11,661	11,600	6,750	30,011
County's share of regional growth (%)	3.9	4.5	3.4	4.0

Source: COG Round 8 Forecasts. Charles County household forecasts are from the Maryland Department of Planning and updated with 2010 Census data.

Jobs

According to current COG forecasts, Charles County will add nearly 9,500 jobs between 2010 and 2020 and substantially fewer jobs in the later decades of the forecast period. The timing of this job growth is suspect, given the nation's slow recovery from the recession. However, for the purpose of this demand analysis, the overall growth over the 30-year period is most relevant. The County's economy will continue to be primarily a local-serving economy and will remain strong in retail and government jobs. Charles County will attract some employers, particularly those looking for larger spaces or office/industrial parks and low rents. However, the County faces some challenges in attracting employers. Compared to some other jurisdictions, Charles County has relatively meager transportation access to the District of Columbia and other parts of the region. Between Charles County and the bulk of the region's employment and population activity centers is Prince George's County. While Prince George's County has not experienced strong job growth in recent decades, it does have a lot of capacity for growth, good highway networks and Metrorail stations. Prince George's County has benefited recently from retail development and employment. In the future, some kinds of employers—office, government and some retail jobs—will consider Prince George's County over Charles County because of its relative transportation assets and its underutilized capacity.

Households

Between 2010 and 2040, Charles County is forecast to add approximately 30,000 households or about 32,300 housing units. Charles County will attract new households because of its relatively lower-cost housing and rural amenities. The County is forecast to capture about 4.6 percent of the Washington Metropolitan Area's total household growth over the 30-year period. Over time, new households in Charles County are expected to have somewhat fewer people, which implies a need in the future for smaller housing units. New households added to Charles County in the 2010-2020 period will have 2.35 people, on average, compared with an average household size of 2.22 for new households added in the 2030-2040 period.

Commercial Land Use Demand

The process for estimating the future demand for commercial land involved forecasting job growth in the County, estimating the current commercial development and commercial land use, and assuming the demand for land increases at the same rate as commercial building space. The following summarizes the process:

1. Project future job growth by job type,
2. Convert jobs into building space,
3. Determine the amount of county land currently developed as commercial, and
4. Apply rates of change in commercial building space to current developed land area to determine future land needed.

1. Project future job growth by type.

Forecasts of future demand for commercial space and land use are based on the COG job forecasts and independent econometric forecasts from MPA Data Services and IHS Global Insight. The COG employment forecasts provide job *totals* (payroll jobs and self-employment) out to 2040 for Charles County, while the MPA and Global Insight forecasts have information on the *types* of jobs.[3]

The job forecasts were grouped into different job types reflecting the type of space they require—office, retail, hospitality, industrial, institutional, and government.[4]

Examples of employment in each group:

- Office: private offices, medical offices, financial and professional services
- Retail: big box retail, small retail, auto dealers
- Hospitality: restaurants, hotels, entertainment and recreation
- Industrial: warehousing, construction, manufacturing, public utilities
- Institutional: health facilities, private schools, churches
- Government: local, state and federal government offices, public schools

A small number of jobs is excluded from this analysis, including farming (approximately 400 jobs) and mining (less than 100 jobs).

The percentages of jobs in each category were calculated from the Global Insight and MPA data (Table 1-3). These shares were then multiplied by the COG totals to forecast jobs by type for the 2010-2040 period (Table 1-4).[5]

Table 1-3. Shares of Total Jobs by Type (%)

Charles County, Maryland

Job Type	2010	2020	2030	2040
Office	16.3	16.3	16.7	17.4
Retail	19.4	19.4	19.9	20.3
Hospitality	12.3	11.4	10.8	10.0
Industrial	17.8	19.3	19.2	19.4
Institutional	11.5	11.9	11.8	11.5
Government	22.7	21.7	21.6	21.4
Total	**100.0**	**100.0**	**100.0**	**100.0**

Source: CRA based on analysis of MPA and Global Insight forecasts

[3] Both the MPA and Global Insight data have limitations for forecasting total job growth in the County. The MPA forecasts were done pre-recession and do not extend past 2030. The Global Insight forecasts were completed more recently but they include only payroll jobs, which constitute only about 70 percent of the county's total job base. Thus, information from both sources were combined and applied to the COG totals to project jobs by type.

[4] Jobs were forecasted by six job types—office, retail, hospitality, industrial, institutional and government. However, when estimating land use demand, the categories were consolidated into three groups: office, retail and industrial. Office, institutional and government were all included in the office land use type, while retail and hospitality were both included in retail. This consolidation was done to more closely align with the land use categories from the County's land use/land cover file and to facilitate discussion for the comprehensive planning process.

[5] Results shown for ten-year increments only. Five-year forecasts are available from the authors.

Table 1-4. Forecasts of Jobs by Type

Charles County, Maryland

Job Type	2010	2020	2030	2040	Change 2010-2040
Office	10,138	11,686	12,942	14,459	4,321
Retail	12,067	13,909	15,422	16,869	4,802
Hospitality	7,650	8,173	8,370	8,310	660
Industrial	11,071	13,837	14,880	16,121	5,050
Institutional	7,153	8,532	9,145	9,556	2,403
Government	14,119	15,558	16,740	17,783	3,664
Total	**62,199**	**71,695**	**77,499**	**83,097**	**20,898**

Note: Excludes agricultural and mining jobs. Figures may not sum due to rounding.

The biggest increase in jobs between 2010 and 2040 will be in the industrial sector, which includes manufacturing, construction yards, warehousing/storage, and other industrial jobs, with the largest gains occurring between 2010 and 2020. Overall, it is projected that there will be about 5,000 new industrial jobs added to the County's economy over the next 30 years. Retail jobs will constitute the second largest growth sector (about 4,800 new jobs), followed by private office (about 4,300 jobs), government jobs (about 3,700 jobs), institutional jobs (about 2,400 jobs) and finally hospitality jobs, which includes hotels and restaurants (about 660 jobs).

2. Convert jobs to building space.

The next step was to convert new jobs into building space. Initially, standard space requirements were applied to the Charles County job numbers.[6] Further assessment using the county real estate assessors' database helped to calculate the amount of recorded commercial space associated with jobs in the county.

Assumptions about space required by future workers were also made. In general, the amount of building space required by each additional worker will decline over time. For office workers (including government and institutional workers), companies have been shifting to smaller work spaces and more shared work spaces when designing buildings. Retail space per worker is also expected to decline. A large share of the retail jobs in Charles County are in big box stores, with large space-per-employee ratios. Over time, it is assumed that new retail will be less likely to be big box stores and more likely to be a mix of relatively smaller-scale retail. In addition, expanding retail operating hours will require more workers to cover existing retail space. As a result, each retail worker will be associated with somewhat less retail space. Table 1-5 summarizes the average square footage per job by job type over the forecast period.

Table 1-5. Estimates of Average Commercial Space (sq. ft.) per Job

Job Type	2010	2020	2030	2040
Office	250	250	240	225
Retail	600	570	540	500
Hospitality	300	300	300	300
Industrial	250	250	250	250
Institutional	450	440	415	400
Government	400	390	370	350

These space use factors were then multiplied by the job forecasts to produce estimates of future demand for different types of commercial building space (Table 1-6).

[6] The Urban Land Institute is one source for standard space requirements.

Table 1-6. Forecasts of Demand for Commercial Space (millions of sq. ft.)
Charles County, Maryland

Space Type	2010	2020	2030	2040	Change 2010-2040
Office	2.5	2.9	3.1	3.3	0.7
Retail	7.2	7.9	8.3	8.4	1.2
Hospitality	2.3	2.5	2.5	2.5	0.2
Industrial	2.8	3.5	3.7	4.0	1.3
Institutional	3.2	3.8	3.8	3.8	0.6
Government	5.6	6.1	6.2	6.2	0.6
Total	**23.7**	**26.6**	**27.7**	**28.3**	**4.6**

The commercial space totals produced by this analysis for 2010 were checked against the Charles County real estate assessors' database, which identified existing commercial and residential properties. The total 23.7 million square feet of existing commercial space in Charles County is very close to the commercial space totaled from the assessors' database (~23 million square feet.) Estimates of office space (including office, institutional and government) and retail space were independently validated with a review of documents from the County Economic Development office and proposed industrial/office park plans that list current space, as well as via conversations with the Economic Development Director.

3. Determine the amount of county land currently developed as commercial.

In order to determine future land needed to accommodate employment growth, an analysis was undertaken of the amount of county land currently developed as commercial. Because there was no single complete source of this information, several sources were used. CRA and ERM analyzed the state's Land Use/Land Cover (LU/LC) GIS dataset for Charles County (LU/LC summarizes current land cover by broad land use type).[7] ERM used the State Department of Assessments and Taxation's (SDAT) Maryland Property View (MPV) GIS layer for Charles County to identify parcels with commercial development that were not included in the LU/LC dataset. The LU/LC dataset indicates a total of 10,643 acres developed with commercial uses (including commercial, industrial and extractive uses). ERM identified another 2,356 acres that were associated with employment centers in the MPV file but were not included in the LU/LC dataset.[8] Added together, this totals 12,999 acres of land currently developed with commercial uses (rounded up to 13,000 acres for subsequent analyses).

This existing commercial land use acreage figure was compared against the acreage reported for commercial properties in the county assessors' database as well as with the land cover data presented in Table 3-1 of the 2006 Charles County Comprehensive Plan, and was found to be consistent with these other sources. CRA and ERM also compared the total non-residential acreage identified in this exercise with the total developed non-residential acreage reported in the county's 2010 official statement (Charles County Budget Book). Communications with Jenifer Ellin of the Charles County Department of Fiscal and Administrative Services[9] helped to clarify the process that the county used to determine the acreage in the official statement. Based on those communications, it was determined that it was likely that the number reported in the official statement is an overestimate. Therefore, the total of 13,000 acres was determined to be the best estimate of the amount of land in Charles County currently developed as non-residential.

The LU/LC dataset does not differentiate the specific types of commercial development. However, codes in the assessors' database indicated whether properties were office, retail or industrial. It was estimated

[7] MDP provided the 2007 LU/LC layer. ERM and County staff updated this layer using 2009 aerial photography and county tax records. Thus, the LU/LC used for this analysis is current as of mid-2009.

[8] Most of this acreage was in areas coded as residential development—but not in rural/agricultural/forest areas.

[9] Email correspondence with CRA dated 6/3/2011 and 6/7/2011.

that 60% of developed commercial land is office (including institutional), 23% is retail and 17% is developed with industrial uses. The shares of these types of commercial development from the assessors' database were applied to the overall 13,000 acres described above. Table 1-7 below summarizes the existing land cover by type of commercial development.

Table 1-7. Existing Commercial Land Cover and Land Demand in 2040 (acres)
Charles County, Maryland

	2010	2040	Change 2010 - 2040	Percent Change 2010-2040
Office	7,853	9,196	1,343	13.6
Retail	2,967	3,403	436	14.7
Industrial	2,180	3,174	994	45.6
Total Commercial	**13,000**	**15,773**	**2,773**	**19.2**

Source: CRA and estimates from the Maryland Land Use/Land Cover dataset and Maryland Property View file.

4. Apply rates of change in commercial building space to current developed land area to determine future land needed.

The final step was to forecast the new land that will be needed to accommodate future job growth and commercial development. To determine future land use demand, the percentage change in commercial space between 2010 and 2040 was calculated for each land use category. This percentage was then used to forecast the additional commercial land area needed to 2040.

For example, the job forecasts and assumptions about space per employee suggest that the amount of industrial space in the county will increase by 45.6 percent between 2010 and 2040.10 Thus, it is estimated that the amount of land developed as industrial will also increase by 45.6 percent, which suggests a need for 994 additional acres for industrial development to 2040.

For the office land uses, the weighted average of the percent change in office, government and institutional space was 13.6 percent. This rate of change was applied to the amount of existing land developed as office and suggests a need for 1,343 additional acres of office space between 2010 and 2040.

Finally, the amount of space associated with retail and hospitality employment is expected to increase by 14.7 percent over the forecast period. It was assumed that the amount of land needed for retail development will also increase by 14.7 percent, which means there will be a need for 436 additional acres for retail development.

This method assumes that future commercial development in the county will be at roughly the same intensity as current development. If the county develops or redevelops at higher densities, less land will be needed. ***Thus, the land use demand summarized in Table 1-7 above is an upper bound of the land that will be required to accommodate future job growth.*** *Also note that these evaluations of land use demand were prepared without regard for available land. Please see section 2 of this Technical Memorandum for information about land supply.*

[10] Recall that industrial space includes manufacturing, construction yards, and warehousing, among other light and heavy industrial uses.

Residential Demand

To calculate the amount of land needed to accommodate future residential growth, CRA analyzed the current population and household forecasts produced by MDP.[11] These household forecasts were translated into housing units based on assumptions about future household sizes and housing mix (i.e., single-family detached, single-family attached/townhomes and multi-family) and residential vacancy rates. The steps to estimate demand for residential land are as follows:

1. Forecast future household growth in the county,
2. Make assumptions about the future housing mix,
3. Determine the amount of land currently developed as residential, and
4. Apply rates of change of housing units to the baseline amount of residential land to forecast residential land use demand.

1. Forecast future household growth.

According to the Maryland Department of Planning forecasts updated with 2010 Census figures, Charles County will add 30,011 households between 2010 and 2040.

2. Make assumptions about future housing mix.

The current housing stock in Charles County is primarily single-family housing with a relatively high share of owner-occupied units. It is estimated that almost three-quarters of the housing units in Charles County are single-family detached units, while about 15 percent are single-family attached or townhouse units. Less than 10 percent of the housing stock is comprised of units in multi-family buildings. The homeownership rate in Charles County exceeds 81 percent and most owners live in single-family housing. There is a small percentage of owner-occupied multi-family units (i.e., condominiums); only 14 percent of multi-family units are owner-occupied and these are mostly in small buildings.[12] In addition, the County has approximately 1,000 mobile home units.

The stock of single-family detached housing in the County has increased faster over the past decade than has the stock of townhouses or multi-family units. In 2000, single-family detached homes accounted for about 71 percent of the housing stock and single-family attached or townhouses units account for nearly 18 percent. The share of multi-family units in 2000 was about nine percent.[13]

Single-family detached and owner-occupied housing will continue to dominate residential development in Charles County, particularly in the near term. All of the residential building permits issued in the County in 2010 were for single-family detached homes.[14] However, over the next several decades, it is forecasted that average household sizes will decline and demand for smaller units—including townhouses, condominiums and multi-family rental units—will increase moderately. These trends are consistent with broader demographic trends both in the Greater Washington area and in suburban communities across the country.

It is estimated that the share of the housing units in Charles County that are single-family detached will decrease to 70 percent by the year 2040, while single-family attached/townhouse units will comprise 18.5 percent and multi-family units will comprise 10.5 percent of all units in the County in 2040.

[11] Forecasts from COG were also reviewed and compared with the Maryland Planning Department forecasts. The two forecast series were very close, so the Maryland Planning Department forecasts were used for the analysis.

[12] Estimates from the U.S. Census Bureau 2009 American Community Survey.

[13] Estimates from the U.S. Census Bureau 2000 Census Summary File 3.

[14] Estimates from the U.S. Census Bureau Residential Construction Survey.

These trends are in line with the *Housing Supply, Demand and Zoning Options Analysis* report completed in October 2010 by the Charles County Planning & Growth Management Department. The difference is in the timing of the shift. The housing market continues to be sluggish in Charles County and residential construction still has yet to rebound. As a result, the movement toward slightly greater shares of townhomes and condominiums will take longer to occur than might have been expected before the housing market downturn.

It is assumed that seven percent of housing units are vacant at any given time.[15] The vacancy rates are applied to the household forecasts to calculate the number of housing units needed to accommodate future household growth. Between 2010 through 2040, the county will need 32,208 net new housing units to accommodate projected population growth. These new housing units will include 20,885 single-family detached homes, 7,553 single-family attached/townhomes and 4,206 multi-family units (Table 1-8).

Table 1-8. Forecasts of Housing Units by Type

Charles County, Maryland

	2010	2020	2030	2040	Change 2010 – 2040
Single-Family Detached	40,191	48,677	56,857	61,076	20,885
Single-Family Attached	8,589	11,223	13,934	16,142	7,553
Multi-Family	4,955	6,423	8,088	9,161	4,206
Mobile Homes	1,229	1,195	1,117	792	-437
Total	**54,963**	**67,518**	**79,997**	**87,171**	**32,208**

3. Determine the amount of land currently developed as residential.

The LU/LC GIS layer identifies the amount of county land developed as residential, including rural residential (densities lower than 0.2 units per acre); low density residential (0.2 to two units per acre), medium density residential (two to eight units per acre) and high density residential (greater than eight units per acre). Land coded as Low Residential was assumed to be single-family detached housing, while the Medium and High Residential areas were combined and were assumed to include single-family attached/townhomes and multi-family buildings.

According to the most recent LU/LC file, there is a total of 62,328 acres developed as residential. The majority—33,328 acres—is developed as Low Residential or with single-family detached homes. Another 10,273 acres is developed at somewhat greater densities, zoned Medium or High residential. The remaining 18,727 acres are rural residential, at very low densities.

4. Apply rates of change of housing units to the baseline amount of residential land to forecast residential land use demand.

The amount of new land needed to accommodate future residential growth is related to the housing unit forecasts. It is assumed that the amount of land developed as residential will increase at the same pace that housing units are expected to grow (Table 1-9).

For example, it is estimated that the number of single-family detached homes in Charles County will increase from 40,191 in 2010 to 61,137 in 2040, an increase of 52.1 percent. Thus, it is assumed that the amount of land developed as Rural Residential and Low Residential will also increase by 52.1 percent, suggesting a need for 9,730 acres of rural residential land and 17,370 acres of land zoned Low Residential to accommodate future growth in single-family homes over the forecast period.

On average, the number of townhomes and multi-family units is expected to increase by 86.6 percent between 2010 and 2040. This rate was applied to the amount of land currently developed as Medium and

[15] Estimate from the U.S. Census Bureau 2010 Census.

High Residential suggesting a demand for 8,897 acres of land to be developed as Medium and High Residential to accommodate future growth of townhomes and multi-family buildings.

These forecasts of land demand assume that rural, low and medium/high residential development occurs roughly at the same densities of existing rural, low, and medium/high residential development. If land is developed at higher intensities then less land will be needed. ***Thus, these forecasts are upper bounds of the amount of land that will be demanded to accommodate future residential growth.*** *Also note that these evaluations of land use demand were prepared without regard for available land. Please see section 2 of this Technical Memorandum for information about land supply.*

Table 1-9. Existing Residential Land Cover and Future Residential Land Demand, 2040 (acres)

Charles County, Maryland

	2010	2040	Change 2010 - 2040	Percent Change 2010-2040
Rural Residential	18,727	28,459	9,732	52.0
Low Residential	33,328	50,698	17,370	52.0
Medium & High Residential	10,273	19,170	8,897	86.4
Total Residential	**62,328**	**98,256**	**35,928**	**57.6**

*Source: CRA and estimates from the Maryland Land Use/Land Cover dataset. *Numbers may not sum due to rounding.*

Section 2. Land Supply Analysis

Introduction

To augment the CRA analysis of land use demand (see Section 1), ERM evaluated the supply of undeveloped land in Charles County that could be used to meet future residential and non-residential demand through 2040. As with the analysis in Section 1, this section assumes no changes in existing zoning. If development at higher intensities were to occur, then less land would be required.

Residential Land

Residential development is permitted by right on most non-commercial land in Charles County. A critical question for the 2012 Comprehensive Plan is whether the County has enough residentially zoned land to accommodate the 32,208 new units projected through 2040 (see Section 1).

Existing Residential Land

Using GIS, ERM mapped existing residential uses identified in the 2009 (LU/LC) layer.[16] There are 62,328 acres of land developed for residential uses. For purposes of this analysis, it was assumed that existing developed residential land had no additional capacity for dwelling units.[17] The exceptions to this assumption are three areas in and around Waldorf that have been specifically identified as major redevelopment sites (see below).

Potential Residential Land

Next, ERM determined the amount of potential (but undeveloped) residential land in the County. ERM particularly focused on two types of land:

Committed Land

Committed Land refers to areas where a preliminary subdivision plan (or subsequent plans or plats) has been submitted to the Department of Planning and Growth Management. In these cases, the land's residential capacity is the number of dwelling units in the relevant subdivision plan or plat. This also includes the following designated redevelopment areas: Waldorf Town Center (the area evaluated in and subsequently rezoned due to the Waldorf Urban Design Study, or WUDS); the Chaney Wash Plant redevelopment; and Waldorf Crossing. In these cases, net development capacity was counted (new units minus existing units that would be replaced). In total, Committed lands comprise 22,383 acres (including several mixed use plans with commercial/ employment capacity), and have residential development capacity of 30,926 dwelling units.

Based on discussions with County staff about the status of these subdivisions, as well as geographically specific population projections developed for the 2012 Comprehensive Plan, ERM estimated that 24,198 of these dwelling units (approximately 80 percent of the total capacity) would be built by 2040. For example, ERM estimated that 8,468 new units would be built in St. Charles (75 percent of the 11,290 remaining units) by 2040.

[16] Specifically, ERM identified land classified as Low Density (LULC code 11), Medium Density (code 12), High Density (code 13), and Rural Residential (codes 191 and 192).

[17] It is understood that, in reality, some "developed" parcels have capacity for—and may be used for—additional housing units (e.g., a cottage built on an 8-acre rural parcel where only one house exists, and where zoning permits up to 2 houses). Conversely, not all "developable" land can support the maximum potential development, due to soil or other limitations.

Other Developable Land

This refers to land that is neither developed nor protected.[18] These areas are typically either agricultural or forest, and include areas within the County's Development District, Deferred Development District, and rural areas. For this category, the land's residential capacity is determined by the typical yield (the number of units per acre that are typically built).[19] For example, Agricultural Conservation zoning permits one dwelling unit per three acres of land, but typically yields one unit per five acres; an undeveloped 30-acre parcel would have capacity for six dwelling units. In total, Other Developable Lands comprise 113,030 acres, with residential development capacity for 29,898 dwelling units. [20]

Residential Supply and Demand

Totaling the two categories described above, there is capacity for 52,309 new dwelling units in Charles County, compared to demand for 32,208 units through 2040. Once the 24,198 Committed units were built, another 8,010 units would be built on Other Developable land. After 2040 (and assuming no changes in zoning or the "grandfathered" status of Committed land), there would be capacity for 6,728 units in Committed lands (30,926 units total capacity, minus 24,198 units built by 2040) and 21,888 units (29,898 potential units in Other Developable areas, minus 8,010 units built through 2040) in other portions of the County. This totals 28,616 dwelling units (6,728 plus 21,888).

Commercial/Employment Land

Existing Commercial/Employment Land

Using GIS, ERM mapped existing commercial/employment uses identified in the 2009 (LU/LC) layer.[21] There are 10,643 acres of employment land in these categories. To ascertain whether this represented all existing employment land, ERM intersected the LU/LC layer with Maryland Property View (MPV) points associated with employment uses (e.g., commercial, industrial, institutional, and extractive). ERM found an additional 2,356 acres of existing employment land not captured by LULC,[22] making the total existing employment acreage in Charles County approximately 13,000 acres (see Map 2-1).

Potential Employment Land

Next, ERM determined the amount of potential (but undeveloped) employment land in the County. ERM particularly focused on two areas: capacity (acreage) in undeveloped land zoned for employment; and undeveloped land in planned developments and redevelopment areas. Using GIS, ERM mapped 9,922 acres of land zoned for employment.[23] By overlaying the LULC, ERM found that 3,136 of these acres were already identified as existing employment (see above), leaving 6,786 acres that are zoned for, but undeveloped as employment (see Table 2-1). From these we subtracted 342 acres as the estimated

[18] As defined by the County's adopted Protected Lands Map, except for the Chesapeake Bay Critical Area, steep slopes, and agricultural preservation districts. While these excepted categories have some level of land protection, they are not fully protected from development.

[19] Yields were provided by the Maryland Department of Planning, based on historical development data in Charles County.

[20] Acreages and potential dwelling unit totals differ from information presented at the Regional Visioning sessions, due to mapping refinements. Specifically, 4,561 acres of Protected Land were added to show stream buffers within the Chesapeake Bay Critical Area. These areas had not been previously mapped. Several areas of committed land were identified and added. The dwelling units associated with these subdivisions had already been counted, but the land itself had not been previously mapped. The net results of these changes are a decrease in Committed lands (557 fewer acres)—this map correction did not impact the number of Committed dwelling units—Developed land (675 fewer acres), and Other Developable land (3,287 fewer acres), but an 1,787 unit increase in Potential Dwelling Units due to the use of refined development yield assumptions.

[21] Specifically, ERM identified land classified as Commercial (LULC code 14), Industrial (code 15), Institutional (code 16), and Extractive (code 17).

[22] ERM did not include 3,395 acres at Indian Head Naval Surface Warfare Center (NSWC) associated with a centroid located close to but not exactly inside the LU/LC layer, since the NSWC is already captured by LU/LC.

[23] This does not include the large PUD zone (St. Charles), which may also contain some future employment land.

residential share of three planned large mixed use projects: Chaney Wash Plant redevelopment, Waldorf Crossing, and Downtown Waldorf (WUDS)—see Table 2-2. We also added 363 acres as the estimated commercial acreage in Heritage Green, a large planned PUD in La Plata (see Map 2).

Based on these calculations ERM therefore estimates that there are approximately 6,800 acres of undeveloped land in Charles County that are designated for commercial/employment uses, compared to demand for 2,773 acres of commercial/employment demand through 2040 (see Section 1), leaving 4,034 acres of commercial/employment land available to meet demands beyond 2040 (6,807 total acres, minus 2,773 acres of demand).

Table 2-1: Summary of Employment Capacity Calculations

	Acres
Area Zoned for Employment	9,922
Area Zoned for Employment and in Employment Use	(3,136)
Area Zoned for Employment and not in Employment Use	6,786
Residential from Chaney, Waldorf Crossing & WUDS[1]	(342)
Future Commercial from Heritage Green[1]	363
Total:	**6,807**

Notes:

1: See Table 2-2

Table 2-2: Detailed Calculation for Major Redevelopment Projects

Future Mixed Use Developments:	**Zoned for Employment**	**Total Acres**	**Estimated Residential Share**	**Planned Residential Acres**	**Planned Employment Acres**
Planned Waldorf-area redevelopment					
Chaney Wash Plant Redevelopment	Yes	365	50%	182	182
Waldorf Crossing	Yes	96	40%	39	57
WUDS	Yes	302	40%	121	181
Subtotal[1]		**763**		**342**	**420**
Heritage Green[2]	**Yes (PUD)**	**908**	**60%**	**545**	**363**

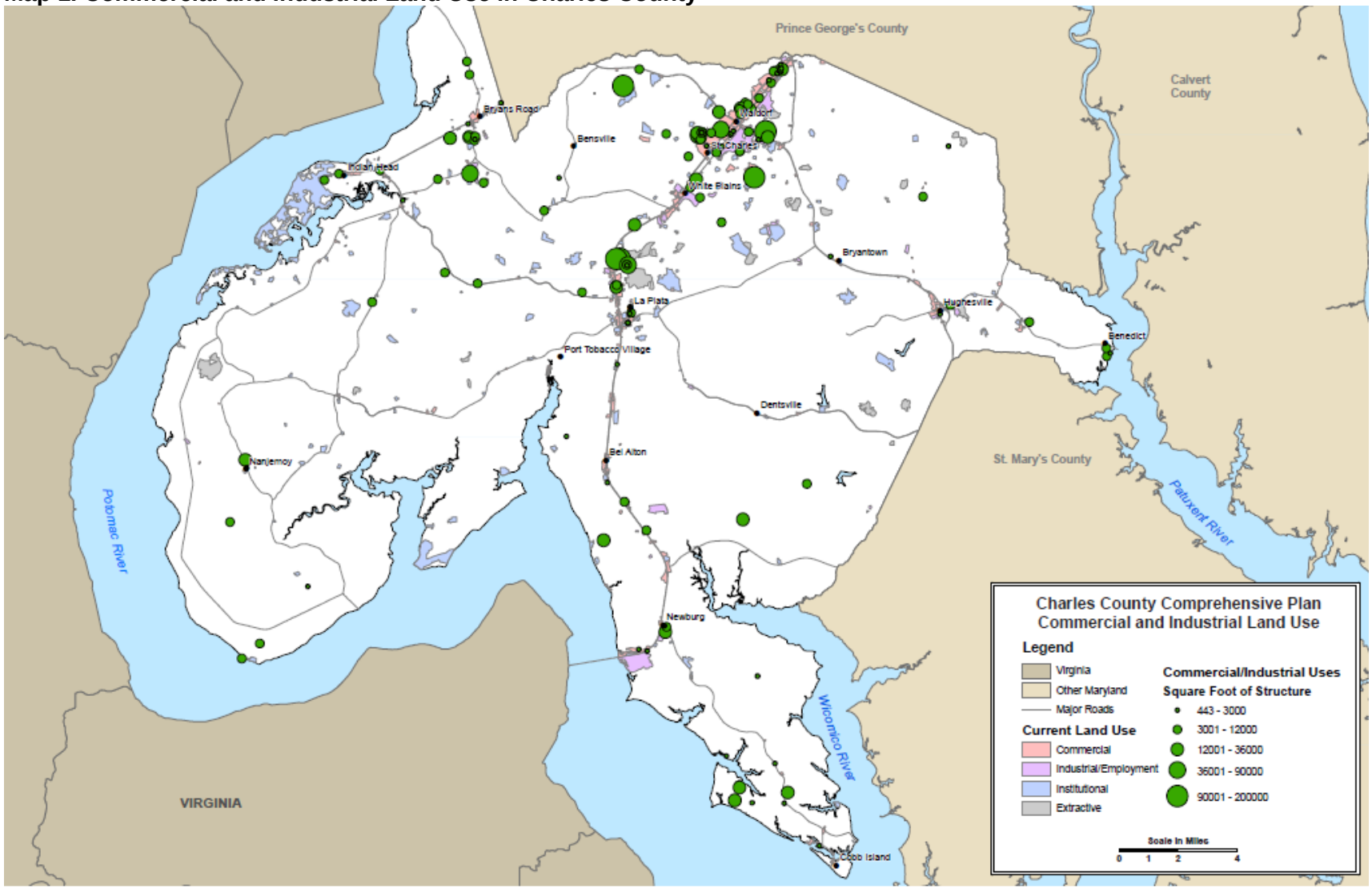
Source: ERM estimates based on preliminary plans and other documentation submitted to the Charles County Department of Planning and Growth Management.

Notes:

1: Planned Residential Acres for these three redevelopments are subtracted from "Area Zoned for Employment" in Table 2-1, because these areas were captured as Employment uses in the initial GIS inventory.

2: Planned Employment Acres for Heritage Green are added to "Area Zoned for Employment" in Table 2-1, because these areas were captured as Residential in the initial GIS inventory.

Map 1. Commercial and Industrial Land Use in Charles County



Map 1. Major Redevelopment Areas in Charles County with Employment Uses