



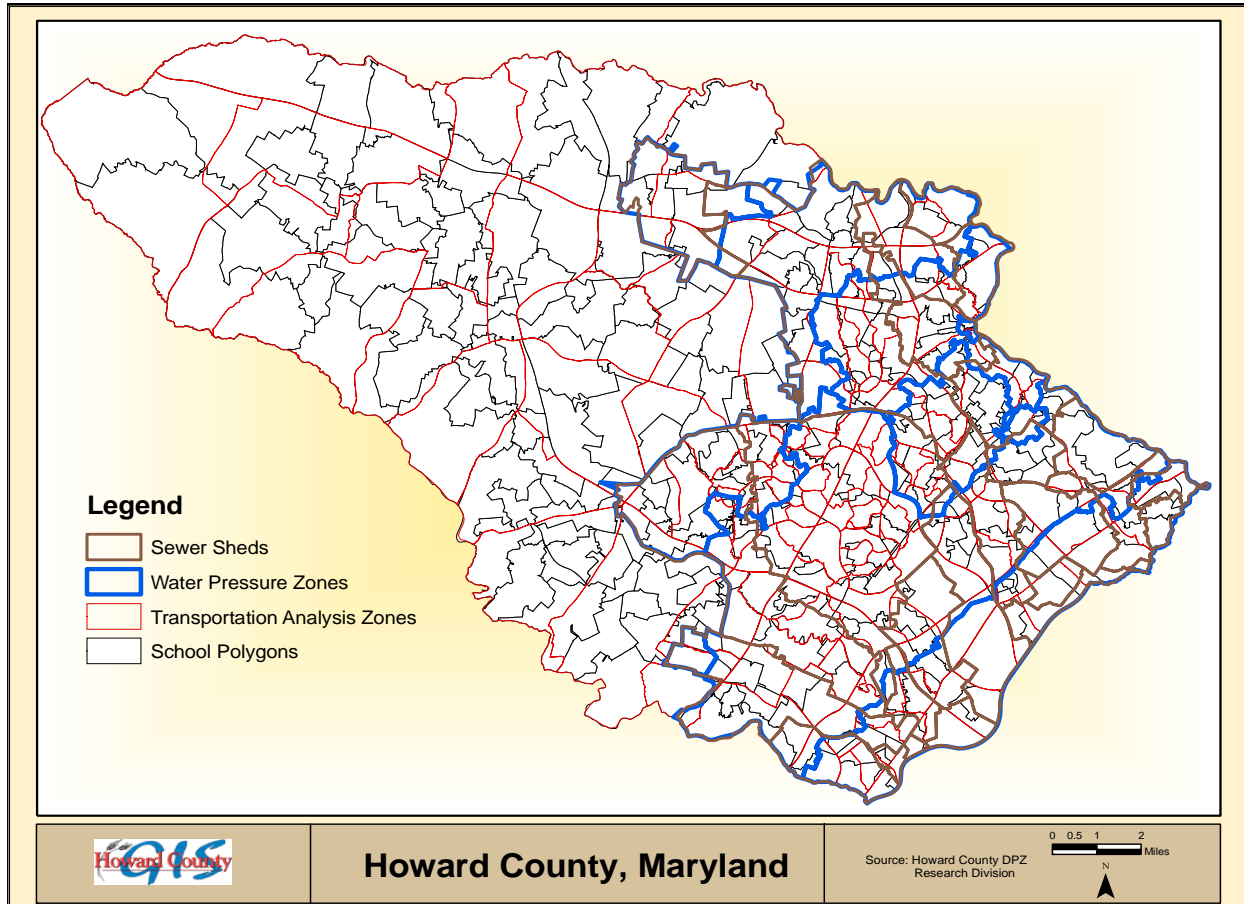
# RESEARCH REPORT

*A publication providing statistical information on Howard County demographics, socioeconomic and employment trends and patterns. Available from the Department of Planning and Zoning by calling (410) 313-4370.*

## Howard County's GIS Land Use Projection System

### Introduction

Land use projections are a critical component of good planning. Anticipating the magnitude, type, pace and location of future development in the County is necessary to ensure adequate planning for infrastructure and operating needs. These primarily include schools, roads, and water & sewer infrastructure. School projections are addressed annually. Transportation planning is also done regularly through the Baltimore Metropolitan Council (BMC) Cooperative Forecasting process. The Water and Sewer Master Plan is updated every 3 years. The map below shows the various "planning polygons" used for these three infrastructure types.



As is clearly apparent in the map, the multiple demands of projecting land uses by differing planning geographies is challenging. Prior to the development of this new GIS system, to be described in this report, it was an arduous task to project housing, population and jobs for these various needs while maintaining consistency with the County's General Plan projections.<sup>1</sup>

Much time would be taken to ensure that any projections generated were synonymous with the General Plan. The Department of Planning and Zoning initially developed land use projections for the 2000 General Plan using statistical areas. These areas have been used for more than 30 years and were denoted on paper maps accompanied by a database of land uses. A manual effort had to be undertaken to translate the projections from one geography to another, for example from statistical areas to transportation analysis zones or to water pressure zones. This was done for the 2003 Water and Sewer Master Plan and also as part of recent Cooperative Forecasting efforts with the BMC. It was also done this way for long range pupil population forecasting.

Beginning in 2003, DPZ converted its paper land use maps to GIS maps. This GIS system consists of about 65,000 records representing more than 100,000 households and thousands of commercial and other nonresidential parcels. Records are amended and added weekly as new plans are submitted and move through the development process. Much of the conversion effort went into quality controlling the placement of data as well as the county's parcel layer.

In 2005, with the mapping effort largely complete, the new GIS projection system was developed as a joint effort with the Howard County Public School System (HCPSS). It grew naturally out of DPZ's ongoing collaboration with the HCPSS. Since around 2000, DPZ has had a good working relationship with the HCPSS regularly supplying and interpreting development information to use as part of their newly developed student projection model. As part of that system, DPZ supplies development information (subdivisions, site plans, building permits, building completions, and housing sales information) on a continuous basis.

Accurate and consistent land use data and projections are useful for other needs besides schools, roads and water & sewer. For example, they have recently been used for watershed analysis in the Sucker and Rockburn branches. The Police Department also makes use of them delineated by their planning areas or beats. The Howard County Library System as well and the Community College also conduct current and projected population analyses for their operating and capital needs. The land use data has also been used for numerous planning studies such as the Route 1 and Route 40 revitalization plans.

The new system has three main advantages: 1) the ability to easily provide *consistent* projections based on the General Plan in *any geography* without a manual interpretation, 2) the ability to show current and projected land uses down to the parcel level<sup>2</sup>, and 3) the ability to update the projections on a more regular basis. These advantages will be described in this report.

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<sup>1</sup> Howard County adopts a new General Plan approximately every 10 years. The last General Plan, adopted in 2000, set the pace of growth in the County for a 20 year period. The Adequate Public Facilities Ordinance (APFO) allocations, which establish the numbers of housing units that can be built per year, are based on the General Plan projections.

<sup>2</sup> For example, for the 2006 Water and Sewer Plan update, the Department of Public Works is using a more precise parcel specific software model rather than the more general model used in the past aggregating land uses by larger water pressure zones and sewer shed areas. This helps model needs at a smaller pipe connection level.

## System Overview

The land use GIS projection system consists of two main parts and processes. First, the inputs to the system come from DPZ's land use database. This database, recently converted to a GIS interface, is continually updated by Research Division staff. *The importance of this continuous maintenance effort cannot be understated and is the most important aspect of the whole system.* For example, many local jurisdictions conduct an analysis of land use for a particular study such as a Comprehensive Plan update, but the data become outdated as soon as the study is complete. So if the process took a year, there could be thousands more housing units and hundreds of thousands or millions of square feet of commercial space built during that timeframe. Development is a dynamic process involving many steps from the initial subdivision plan to final use and occupancy permit. Tracking development overtime on a regular basis is clearly important for the projection system to work in a dynamic real time environment.

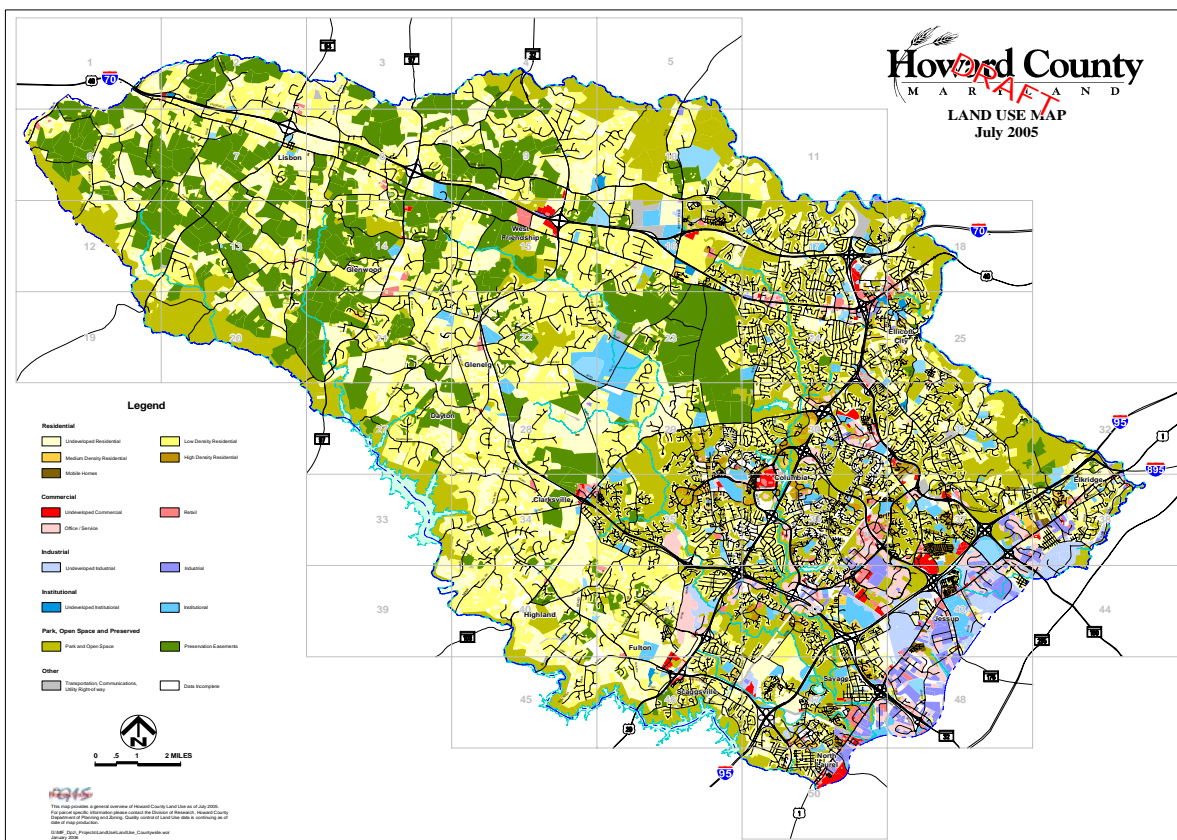
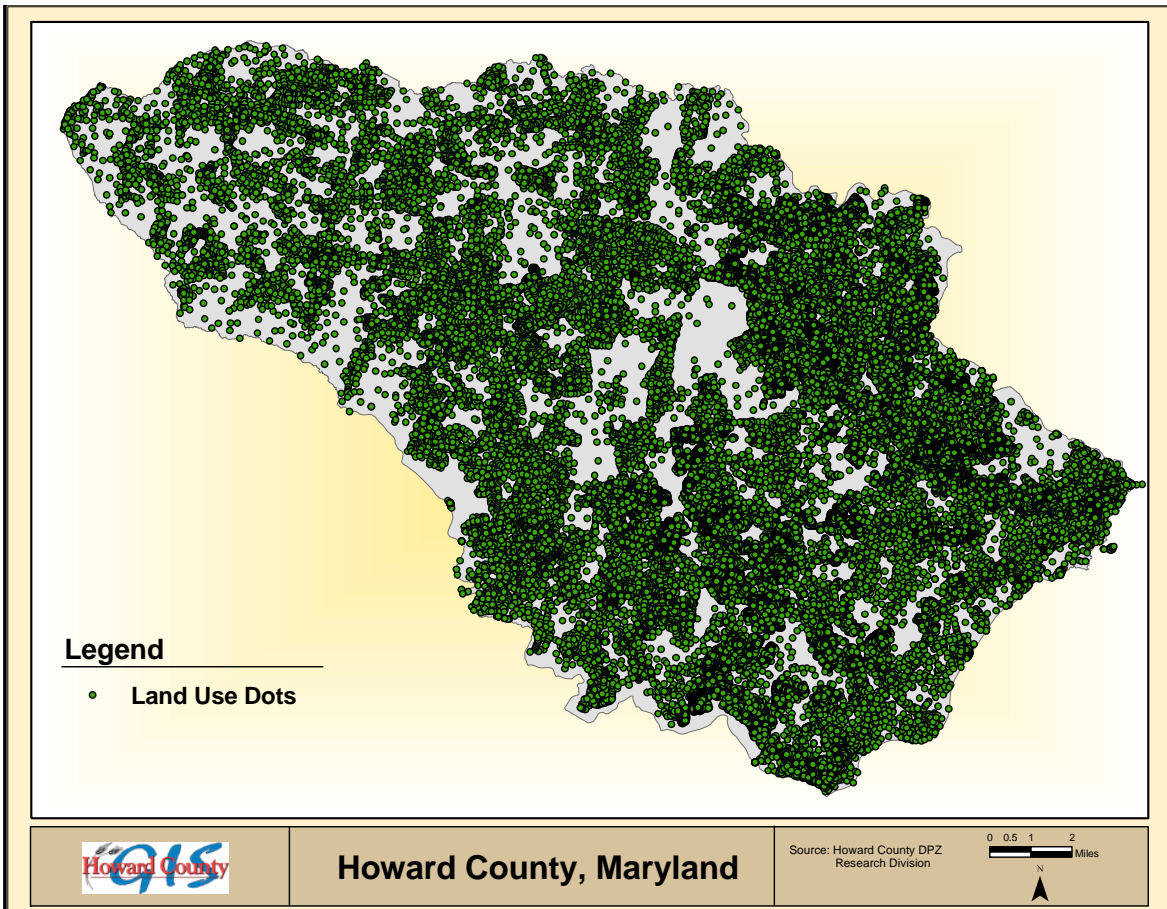
The second component to the system is the land use projection model. This model was developed in FoxPro by a programmer with the Howard County Public School System as a tool for DPZ to use in determining the location and timing of future housing units. These housing projections are then used as an input to their student projections system. The model output has been adapted over time and can now be used for both residential and nonresidential projections at *any geography* given projections are done at the parcel level. Manual interpretations and translations from one geography to another are a thing of the past.

## Land Use Database

DPZ's land use "database" has been in existence since 1979. It was initially created by conducting fields surveys and marking up state tax maps. Hand written tabulations accompanied the maps. New land uses were added to the maps and paper lists over time as new plats were recorded and buildings erected. The land use tabulations were first entered into a computer database in 1990. From then until about 2003, the database was used in conjunction with the paper land use maps to evaluate current and project future land uses. A sample of the map is shown on the next page. In 2003, the conversion to a full GIS began.

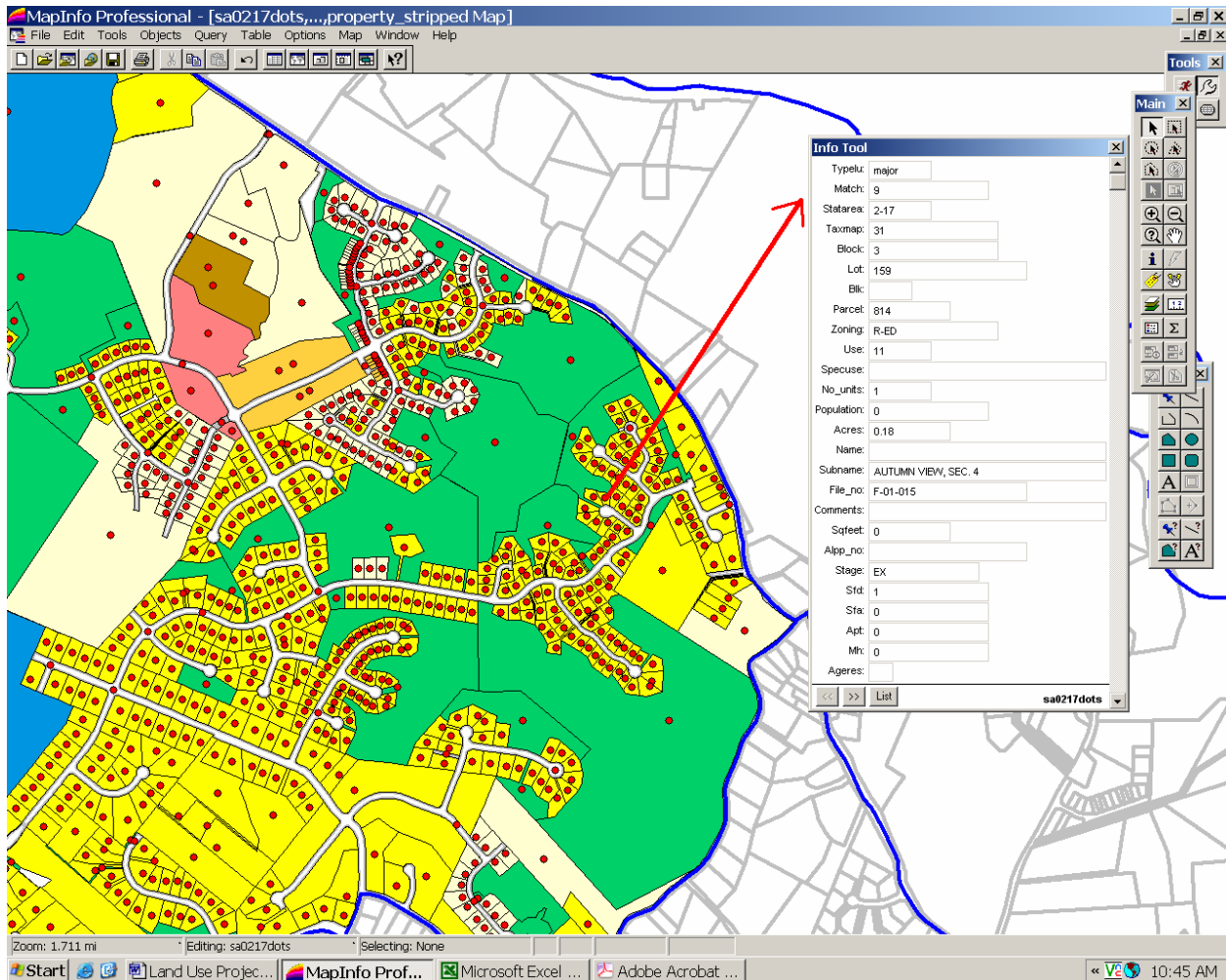
Currently, the land use database consists of almost 65,000 records denoting numerous residential and nonresidential uses including over 100,000 housing units and thousands of commercial, industrial, road, utility and governmental parcels. Each record is geographically located as a land use "dot." New dots are added or amended on a regular basis as new land uses are created or changed. Changes are detected, where possible, based on interior completion permits. A version of the map showing the 65,000 records is shown on Page 5. The County's first draft land use map utilizing this information was produced in July, 2005. This land use map is updated every six months based on the latest development information and incorporates all new refinements and fixes. A reduced sized version of the 36" by 44" map is shown on the bottom of Page 5. The information contained in the land use dots are used to "color" the various parcels to create a countywide land use thematic. A larger version in Adobe Acrobat format is on the County's web site at the following link: <http://www.co.ho.md.us/gis/LandUse.htm>





## Database Fields

Each dot in the land use GIS contains information pertaining to that particular land use. The information included is shown in the image below. The main fields used for the projection system include 1) Zoning, 2) Use, 3) Acres, 4) Stage, 5) Sfd, 6) Sfa, 7) Apt, 8) Mh. These fields are defined further below.



### 1. Zoning

There are currently 34 zoning categories in Howard County. The associated zone for each land use record is added to this field. Future residential and nonresidential development capacity is calculated for undeveloped land depending on the zone.

### 2. Use

There are 114 land use codes each describing a unique use. (See the Appendix of this report for a complete listing of uses). The projection system relies primarily on use codes 10, 20, 30 and 40. These represent undeveloped residential, undeveloped commercial, undeveloped industrial, and undeveloped government and institutional, respectively.

### **3. Acres**

This field represents the size in acres of the particular land use. It is used along with zoning to calculate development capacity and type.

### **4. Stage**

This field contains 1 of 4 codes: a) Existing (EX), b) Unbuilt (UNBLT), c) In Process (INP) and d) Undeveloped (UNDEV). Existing refers to an existing use. Unbuilt refers to a lot that has been recorded or has had an approved site development plan but has no structure built on it as of yet. It also refers to smaller parcels where only one housing unit can be built (less than 6 acres in the Rural West and less than ½ acre in the East). In Process refers to a land use record that is under subdivision or site plan review. Undeveloped refers to vacant undeveloped land.

Note that for nonresidential land uses, a stage of SIGNED is entered instead of UNBLT. This is just a terminology difference based on the fact that a signed SDP is more relevant at this stage compare to a recorded plat for a residential subdivision.

### **5-8. Sfd, Sfa, Apt, Mh**

The number of units for each residential use type are placed in these fields. They stand for single family detached, single family attached (townhouse), apartment (either condo or rental)<sup>3</sup>, and mobile home.

These fields together define the type and stage of use. For example, the record shown in the image above is a existing single family detached unit. If the stage was UNBLT it would be an unbuilt lot with the potential for one single family detached unit. If the stage was INP it would represent a subdivision plan with the potential for one additional unit. For a larger parcel and the stage was UNDEV, then the potential units by type would be placed in these fields calculated based on zoning and acreage. The sections below will further clarify this.

## **Land Use Data Tracking Process**

The land use data tracking process is an integral and key component to the projection system. As indicated earlier, the land use database needs to be continuously maintained or it will become out of date relatively quickly. Currently, about 1,500 to 2,000 housing units are built per year in Howard County. Several million square feet of commercial and office space are developed each year as well. Redevelopment in some parts of the County, particularly along the Route 1 Corridor is also starting to occur. Although the County is over 80% “built out” and is considered a maturing jurisdiction, new development needs to be continuously tracked in order to have up to date land use and projections. In addition, quality control continues as the county’s parcel base gets refined and more information is known/corrected.

The development tracking process is used for a number of other applications as well. DPZ is mandated by the APFO to produce an annual report on development. This report, known as the Development Monitoring System report, tabulates development activity by stage over the past year as well as a rolling five year summary. The report can be accessed on DPZ’s web site at the following link: <http://www.co.ho.md.us/DPZ/DPZDocs/DMS2005.pdf>.

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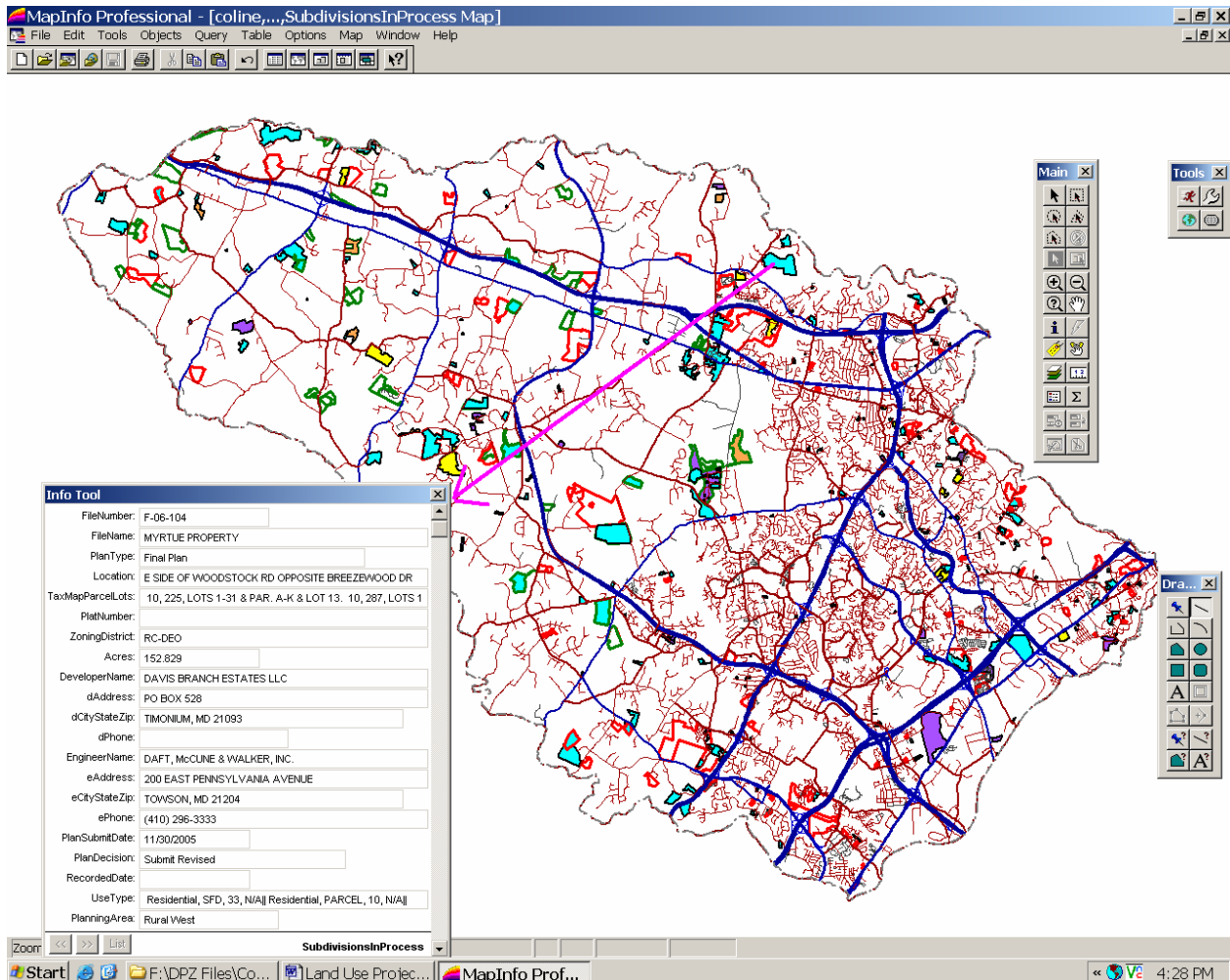
<sup>3</sup> The condo or rental distinction is defined by the use code.

The tracking system is also used to generate information relating to APFO and new development on a regular real-time basis for public and other governmental agency use. Much of this information is accessible on DPZ's web site. For example, a mapping application has been developed that shows all in-process plans. A web user can simply enter an address and a search radius to generate an interactive map showing all development plans. Weekly and monthly APFO and subdivision reports are also generated and posted on the web. Given plans are tracked daily, the latest plan status can be gleaned from DPZ's tracking system for a public inquiry. DPZ also maintains a monthly housing unit construction and population report which is generated from this system: <http://www.co.ho.md.us/DPZ/DPZDocs/ConstructionReport.pdf>.

About 2.5 full-time equivalent personnel are used to maintain this tracking system from initial plan submission to final use and occupancy permit. All stages in between are tracked as part of this process including plan revisions, next plan stage submissions and revisions, plat recordation, site development plan submissions and approvals and issued building permits.

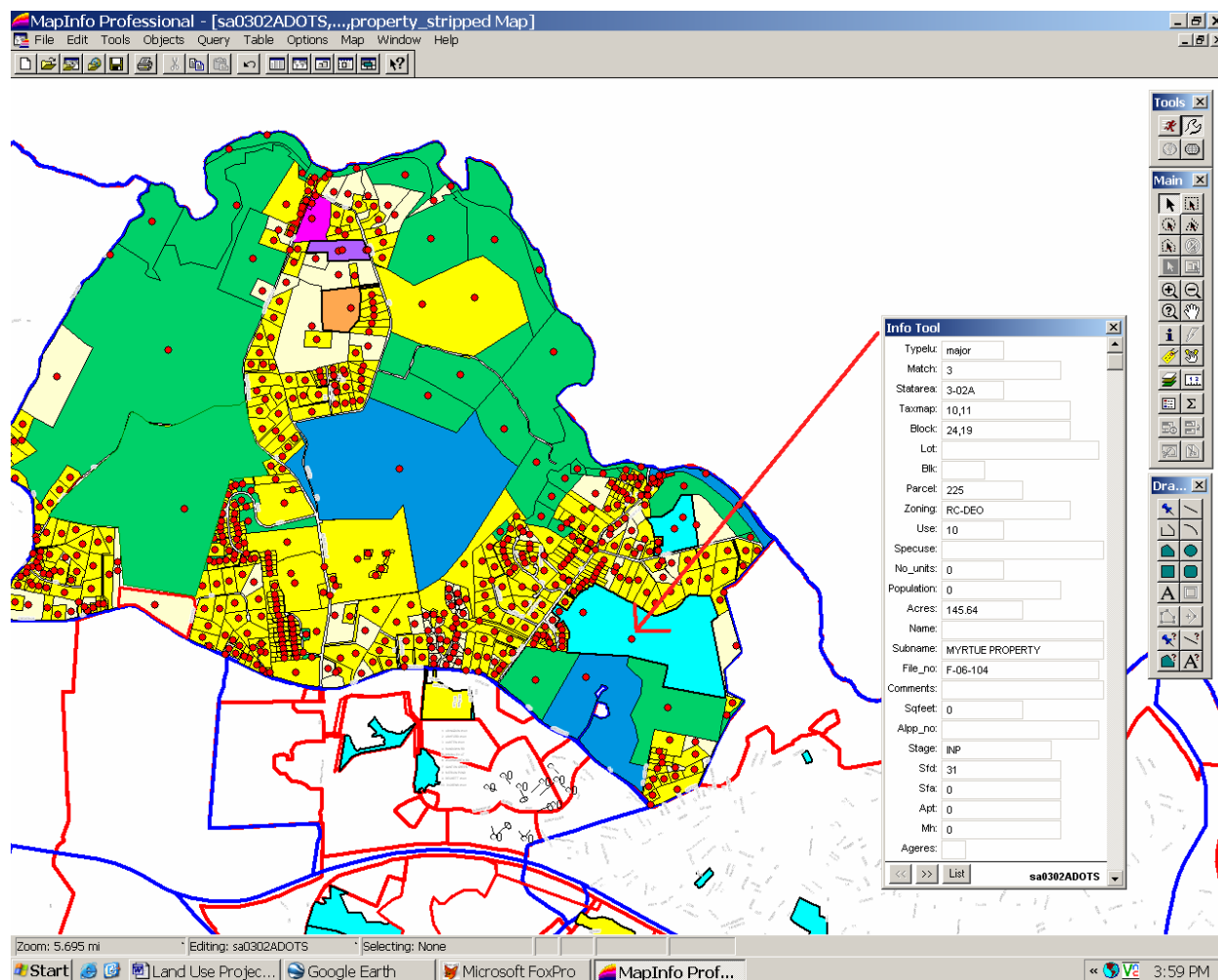
### ***Residential Data***

The map below shows the subdivisions in process GIS layer which is maintained for internal use as well as external web queries. The polygon in the example below represents a 33 unit subdivision that came in on a 153 acre parcel in the Rural West. When a new subdivision gets submitted, the associated land use dot gets amended to reflect this information.





The map below shows this same layer in conjunction with the land use dot on that parcel. When the subdivision was submitted, the land use dot gets amended to reflect that the stage is now in process (INP) with 31 single family detached units. (It is 31 units rather than 33 because two existing units are included in the subdivision in this case.) Prior to the new subdivision, the stage was undeveloped (UNDEV).



Thus as development gets tracked the stage field is amended over time from *undeveloped*, to *in process*, to *recorded unbuilt*, to *existing*. Existing units are based on what is built by tracking use and occupancy permits from the Department of Inspections, Licenses and Permits. In process and recorded unbuilt units come from subdivision and site development plans. Unit potential from undeveloped land is calculated based on the zoning and acreage. The table below shows the factors used for the undeveloped land calculations.

### Yield Factors by Zoning for Undeveloped Land

Zoning	Gross Density (Units per Acre)	SFD	SFA	APT
RR-DEO	0.235	100%		
RR-MXD-3	3.000	35%	35%	30%
RC-DEO	0.235	100%		
R-ED	1.580	80%	20%	
R-20	1.510	100%		
R-20-MXD3	3.000	35%	35%	30%
R-12	2.520	100%		
R-SC	3.720	50%	50%	
R-SC-MXD3	3.000	35%	35%	30%
R-SA-8	6.240		75%	25%
R-SA-8-MXD-3	3.000	35%	35%	30%
R-A-15	9.230			100%
POR-MXD-6	6.000	35%	35%	30%
M-1-MXD-3	3.000	35%	35%	30%

The gross density factors are based on an analysis of typical yields of subdivisions by zoning category. The numbers of single family detached, single family attached and apartment (rental or condo) units are determined based on the yields and the percentage distributions. For example, a typical subdivision that comes in on a parcel of undeveloped R-ED land would yield 1.58 units per gross acre and include 80% single family detached and 20% single family attached units.

Data for other residential zones such as the Planned Senior Community (PSC) overlay and the Residential Senior Institutional (RSI) zones are manually entered into the land use dots given that plans for these in most cases are known. In addition, as part of the projection process, the Research Division maintains and reviews a list of “special” or unique properties based on common knowledge about these sites. These assumptions are revisited when new projections are conducted. This includes many of the sites with the new mixed use Community Activity Center (CAC) and Transit Oriented Development (TOD) zoning districts created along the Route 1 Corridor for revitalization purposes.

As of January 1, 2006, there were 101,441 existing residential units in the County, 4,937 unbuilt lots, 10,077 in process units and 13,565 units estimated from undeveloped land. The table on the next page summarizes these totals by Planning Area. This can be considered a summary of the residential data in the land use database. The map on the following page shows the boundaries of the five Planning Areas which are General Plan 2000 delineations.

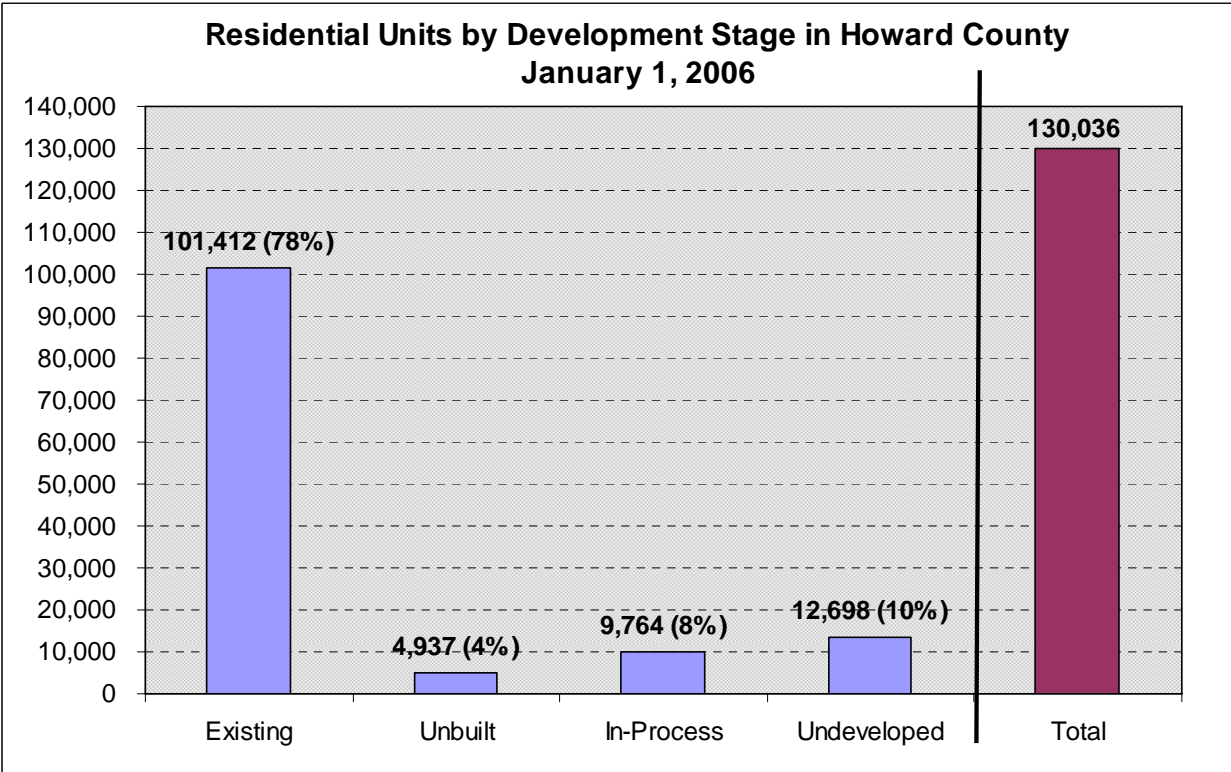
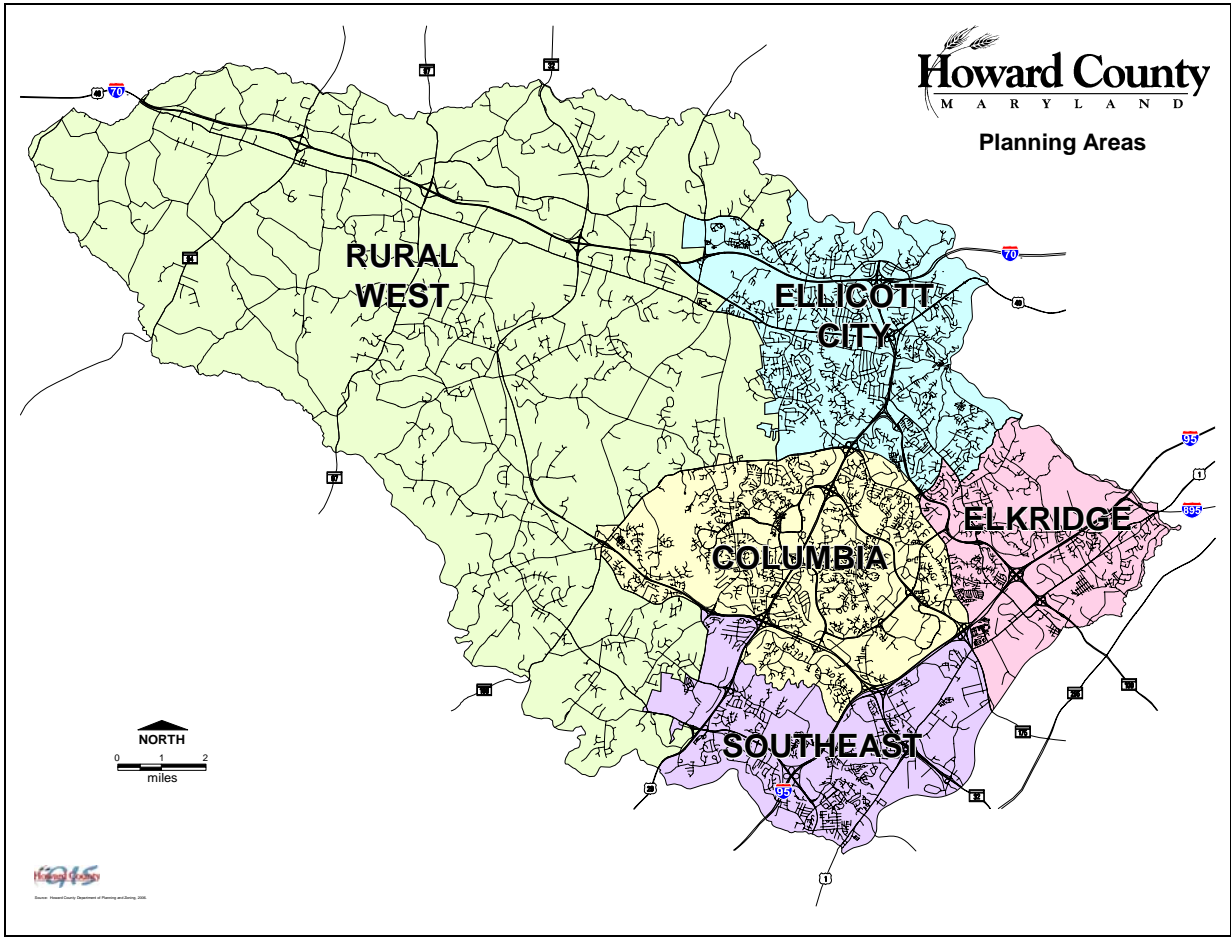
Overall, the total countywide capacity based on current zoning is about 130,000 units. Of these units, 78% are already built, 4% are recorded unbuilt (or on small parcels), 8% are in-process and 10% are undeveloped. These percentages are also shown for each Planning Area. The charts following the map show the data in the tables graphically.

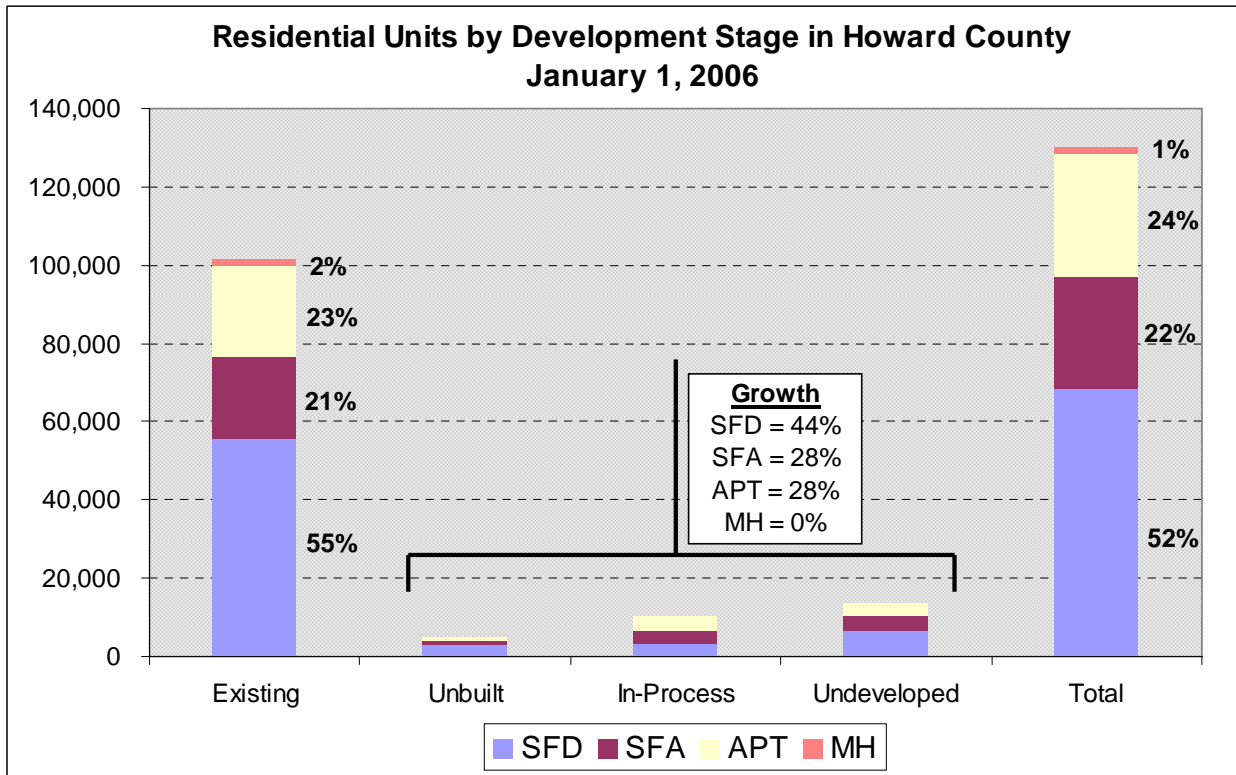
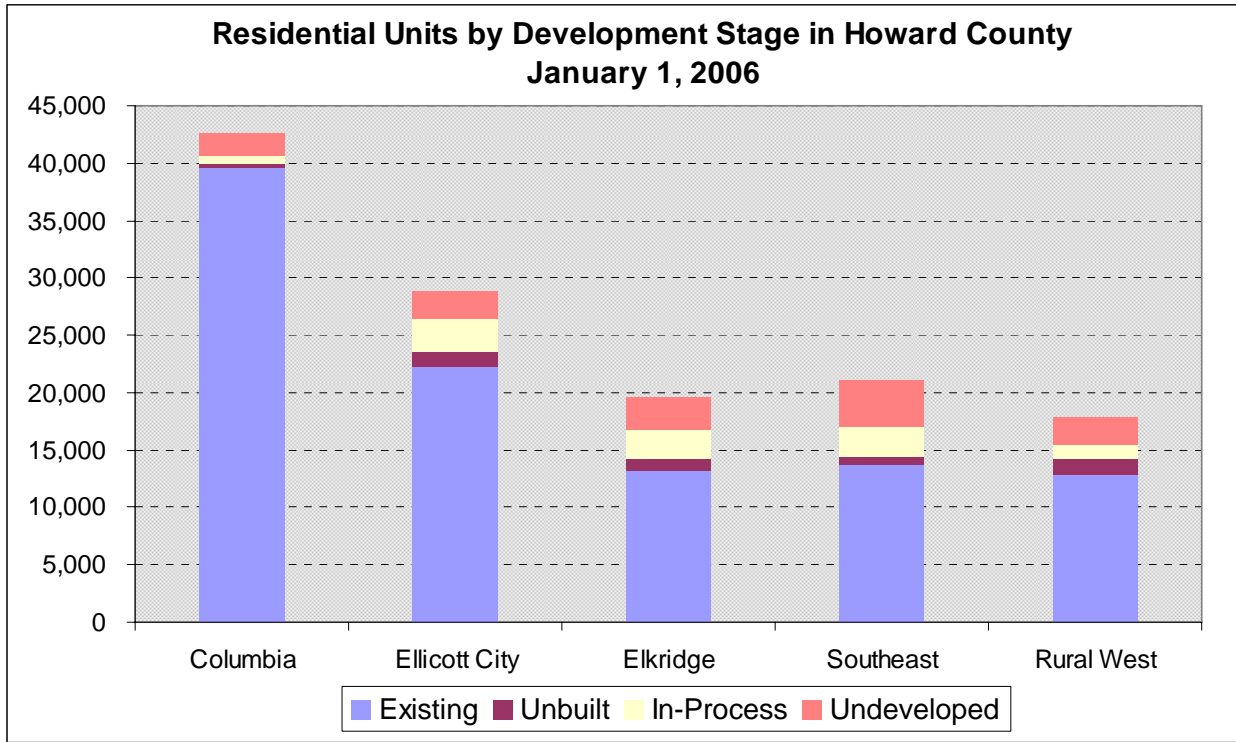
Currently about 55% of existing units are single family detached, 21% single family attached, 23% apartment (rental or condo) and 2% mobile homes. For the new units between now and when the County is built out, about 44% will be single family detached, 28% single family

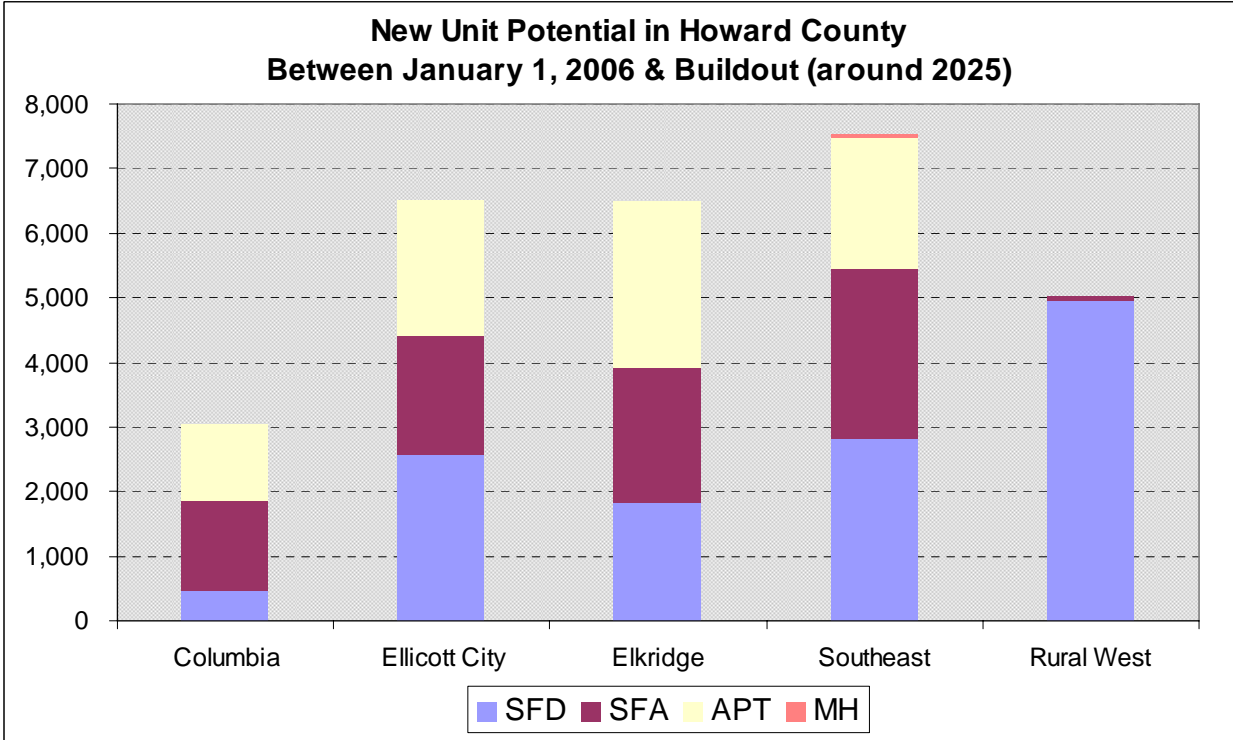
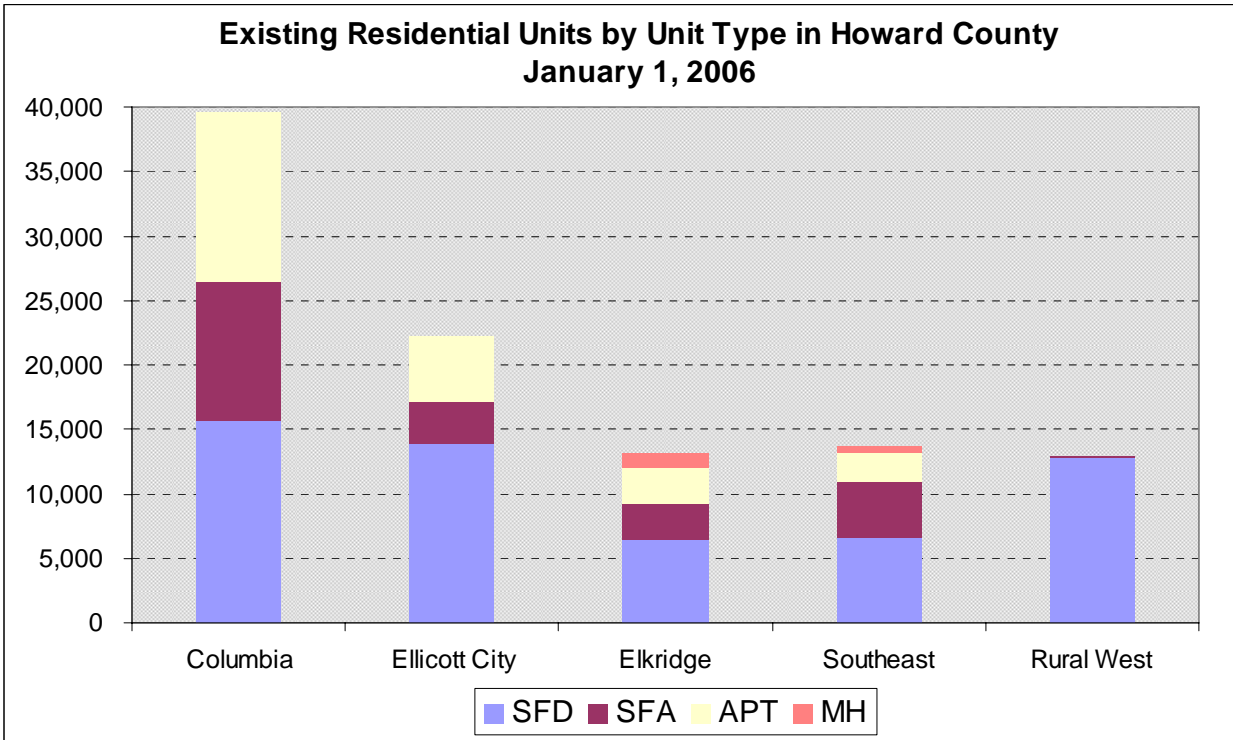
attached and 28% apartment (condo and rental). The greater proportions of future single family attached and apartment units compared to single family detached units is due to larger amounts of undeveloped or underdeveloped land in higher density zones. During the last comprehensive rezoning in 2003 more higher density zones were created, particularly along the Route 1 Corridor.

**Residential Unit Distribution by Stage and Type**  
**Existing Units as of January 1, 2006 & In-Process Units as of March 24, 2006**

		<b>SFD</b>	<b>SFA</b>	<b>APT</b>	<b>MH</b>	<b>Total</b>	<b>Percent</b>
<b>Columbia</b>	Existing	15,649	10,757	13,160	0	<b>39,566</b>	<b>92.9%</b>
	Unbuilt	147	157	74	0	<b>378</b>	<b>0.9%</b>
	In-Process	73	380	297	0	<b>750</b>	<b>1.8%</b>
	Undeveloped	260	840	809	0	<b>1,909</b>	<b>4.5%</b>
	<b>Total</b>	<b>16,129</b>	<b>12,134</b>	<b>14,340</b>	<b>0</b>	<b>42,603</b>	<b>100.0%</b>
<b>Ellicott City</b>	Existing	13,975	3,167	5,079	0	<b>22,221</b>	<b>77.3%</b>
	Unbuilt	502	233	657	0	<b>1,392</b>	<b>4.8%</b>
	In-Process	661	932	1,139	0	<b>2,732</b>	<b>9.5%</b>
	Undeveloped	1,417	657	317	0	<b>2,391</b>	<b>8.3%</b>
	<b>Total</b>	<b>16,555</b>	<b>4,989</b>	<b>7,192</b>	<b>0</b>	<b>28,736</b>	<b>100.0%</b>
<b>Elkridge</b>	Existing	6,490	2,658	2,847	1,120	<b>13,115</b>	<b>66.9%</b>
	Unbuilt	515	325	246	0	<b>1,086</b>	<b>5.5%</b>
	In-Process	545	998	1,044	0	<b>2,587</b>	<b>13.2%</b>
	Undeveloped	766	755	1,290	0	<b>2,811</b>	<b>14.3%</b>
	<b>Total</b>	<b>8,316</b>	<b>4,736</b>	<b>5,427</b>	<b>1,120</b>	<b>19,599</b>	<b>100.0%</b>
<b>Southeast</b>	Existing	6,576	4,409	2,239	408	<b>13,632</b>	<b>64.4%</b>
	Unbuilt	512	174	0	42	<b>728</b>	<b>3.4%</b>
	In-Process	662	891	1,202	0	<b>2,755</b>	<b>13.0%</b>
	Undeveloped	1,643	1,558	842	0	<b>4,043</b>	<b>19.1%</b>
	<b>Total</b>	<b>9,393</b>	<b>7,032</b>	<b>4,283</b>	<b>450</b>	<b>21,158</b>	<b>100.0%</b>
<b>Rural West</b>	Existing	12,816	86	0	5	<b>12,907</b>	<b>71.9%</b>
	Unbuilt	1,315	54	0	0	<b>1,369</b>	<b>7.6%</b>
	In-Process	1,233	20	0	0	<b>1,253</b>	<b>7.0%</b>
	Undeveloped	2,411	0	0	0	<b>2,411</b>	<b>13.4%</b>
	<b>Total</b>	<b>17,775</b>	<b>160</b>	<b>0</b>	<b>5</b>	<b>17,940</b>	<b>100.0%</b>
<b>Coutywide</b>	Existing	55,506	21,077	23,325	1,533	<b>101,441</b>	<b>78.0%</b>
	Unbuilt	2,991	943	977	42	<b>4,953</b>	<b>3.8%</b>
	In-Process	3,174	3,221	3,682	0	<b>10,077</b>	<b>7.7%</b>
	Undeveloped	6,497	3,810	3,258	0	<b>13,565</b>	<b>10.4%</b>
	<b>Total</b>	<b>68,168</b>	<b>29,051</b>	<b>31,242</b>	<b>1,575</b>	<b>130,036</b>	<b>100.0%</b>







The model also has the ability to separate out age-restricted or senior units. This is shown in the table below. Of the 101,441 units built in the County as of January 1, 2006, 1,745 were age-restricted units (about 2% of the total). Based on current unbuilt units, plans in process and undeveloped land, it is estimated that an additional 3,092 age-restricted units will be built. This is about 11% of the total 28,595 future units. At buildout, close to 4%, or about 1 out of every 25 units will be age-restricted.

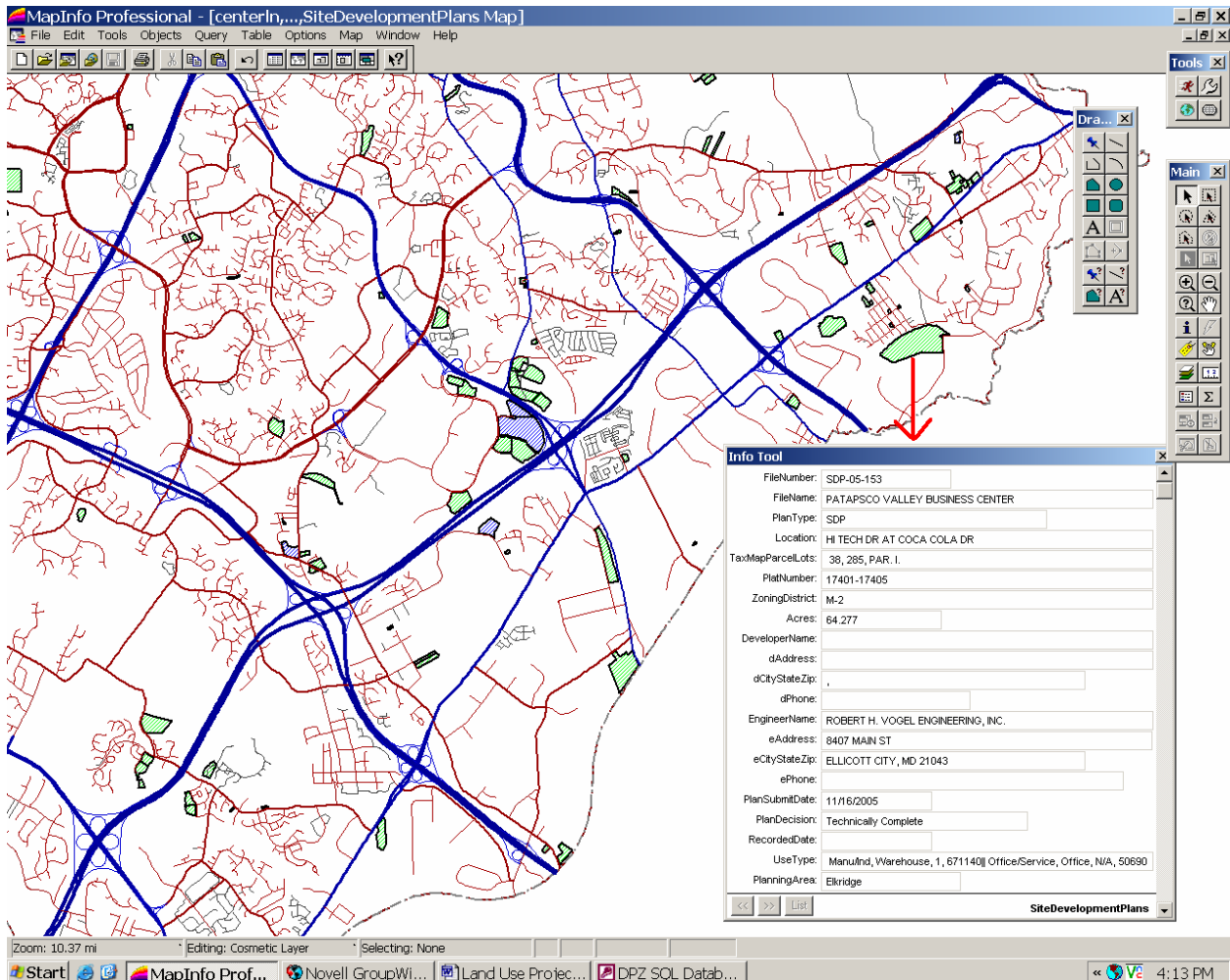
**Residential Unit Distribution by Stage and Type**  
**Existing Units as of January 1, 2006 & In-Process Units as of March 24, 2006**

		<b>SFD</b>	<b>SFA</b>	<b>APT</b>	<b>MH</b>	<b>SR-SFD</b>	<b>SR-SFA</b>	<b>SF-APT</b>	<b>Total</b>
<b>Columbia</b>	Existing	15,649	10,580	12,800	0	0	177	360	<b>39,566</b>
	Unbuilt	147	1	0	0	0	156	74	<b>378</b>
	In-Process	73	301	221	0	0	79	76	<b>750</b>
	Undeveloped	260	840	809	0	0	0	0	<b>1,909</b>
	<b>Total</b>	<b>16,129</b>	<b>11,722</b>	<b>13,830</b>	<b>0</b>	<b>0</b>	<b>412</b>	<b>510</b>	<b>42,603</b>
<b>Ellicott City</b>	Existing	13,974	2,994	4,595	0	1	173	484	<b>22,221</b>
	Unbuilt	502	71	98	0	0	162	559	<b>1,392</b>
	In-Process	661	706	1,004	0	0	226	135	<b>2,732</b>
	Undeveloped	1,206	299	248	0	211	358	69	<b>2,391</b>
	<b>Total</b>	<b>16,343</b>	<b>4,070</b>	<b>5,945</b>	<b>0</b>	<b>212</b>	<b>919</b>	<b>1,247</b>	<b>28,736</b>
<b>Elkridge</b>	Existing	6,490	2,598	2,577	1,120	0	60	270	<b>13,115</b>
	Unbuilt	515	325	84	0	0	0	162	<b>1,086</b>
	In-Process	545	946	1,044	0	0	52	0	<b>2,587</b>
	Undeveloped	766	618	1,231	0	0	137	59	<b>2,811</b>
	<b>Total</b>	<b>8,316</b>	<b>4,487</b>	<b>4,936</b>	<b>1,120</b>	<b>0</b>	<b>249</b>	<b>491</b>	<b>19,599</b>
<b>Southeast</b>	Existing	6,574	4,390	2,179	408	2	19	60	<b>13,632</b>
	Unbuilt	491	174	0	42	21	0	0	<b>728</b>
	In-Process	662	806	850	0	0	85	352	<b>2,755</b>
	Undeveloped	1,643	1,558	842	0	0	0	0	<b>4,043</b>
	<b>Total</b>	<b>9,370</b>	<b>6,928</b>	<b>3,871</b>	<b>450</b>	<b>23</b>	<b>104</b>	<b>412</b>	<b>21,158</b>
<b>Rural West</b>	Existing	12,763	0	0	5	53	86	0	<b>12,907</b>
	Unbuilt	1,270	0	0	0	45	54	0	<b>1,369</b>
	In-Process	1,233	0	0	0	0	20	0	<b>1,253</b>
	Undeveloped	2,411	0	0	0	0	0	0	<b>2,411</b>
	<b>Total</b>	<b>17,677</b>	<b>0</b>	<b>0</b>	<b>5</b>	<b>98</b>	<b>160</b>	<b>0</b>	<b>17,940</b>
<b>Coutywide</b>	Existing	55,450	20,562	22,151	1,533	56	515	1,174	<b>101,441</b>
	Unbuilt	2,925	571	182	42	66	372	795	<b>4,953</b>
	In-Process	3,174	2,759	3,119	0	0	462	563	<b>10,077</b>
	Undeveloped	6,286	3,315	3,130	0	211	495	128	<b>13,565</b>
	<b>Total</b>	<b>67,835</b>	<b>27,207</b>	<b>28,582</b>	<b>1,575</b>	<b>333</b>	<b>1,844</b>	<b>2,660</b>	<b>130,036</b>

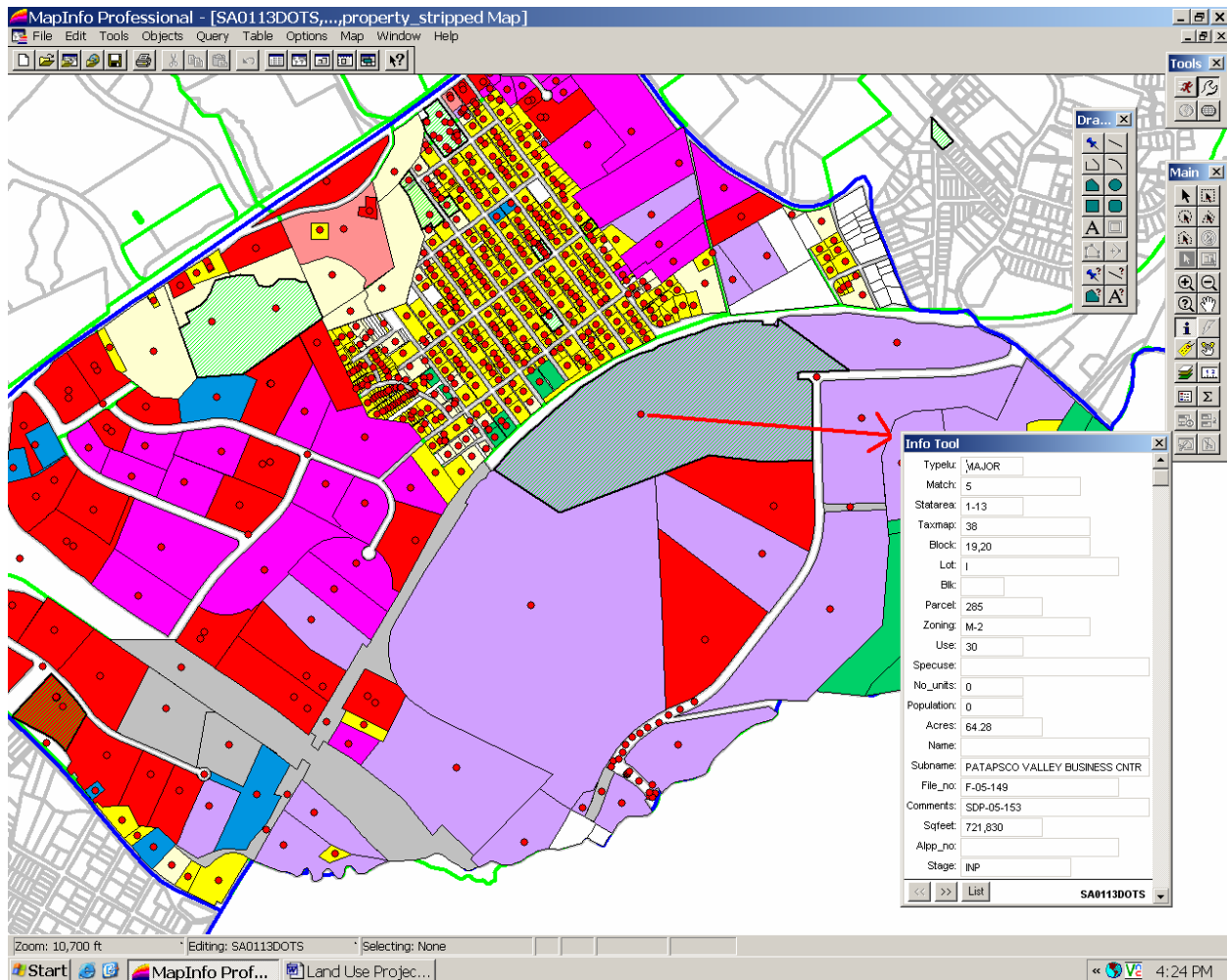
### Nonresidential Data

As displayed in the Appendix there are 114 land use codes. The majority of these denote various nonresidential uses. They break down into seven main categories: 1) commercial, 2) industrial, 3) transportation & utilities, 4) institutional, 5) government (including schools), 6) parks & open space (including county, state and HOA land), and 7) other. Similar to residential projections, nonresidential projections also rely on four stages as development is tracked over time from *undeveloped*, to *in process*, to *signed*, to *existing*. However, in process and signed *site development plans* are tracked rather than in process and recorded subdivisions. This is because for nonresidential land, site development plans better denote future construction activity.

The map below shows the in-process site development plan GIS layer which is maintained for internal use as well as external web queries (similar to the subdivision in-process layer). The polygon in the example below represents a site development plan on 64 acres including 671,000 square feet of warehouse and 50,690 square feet of office space. This information is tracked and included on the land use dot associated with this plan as shown on the second map below. The stage for that parcel is then denoted as in process or INP. When the site development plan is signed then the stage gets changed to that, and then it gets changed to existing once the buildings are constructed and occupied. Similar to the gross density factors by zoning which are used to calculate future residential units, employee per acre factors by zoning are used to estimate potential employment.







The tables below and the following charts summarize the nonresidential acreage as of January 1, 2006. As of that time, there were 48,231 acres of developed (existing) nonresidential land. This includes 4,003 acres of commercial uses, 3,535 acres of industrial, 8,849 acres of transportation & utility<sup>4</sup>, 1,975 acres of institutional, 5,155 acres of government, 24,238 acres of parks and open space, and 475 acres of other<sup>5</sup>.

Isolating just the commercial and industrial land uses, 7,539 acres are developed. This represents 74% of the total 10,120 acres zoned for these types of uses. Most of the remaining 2,581 acres are in Elkridge and the Southeast. About 3% (307 acres) of the total commercial and industrial land were covered by signed site development plans and another 3.4% (342 acres) were covered by in-process plans. In both of these cases, the land had yet to be built on. The remaining 1,933 acres, 19% of the total, were undeveloped with no plans.

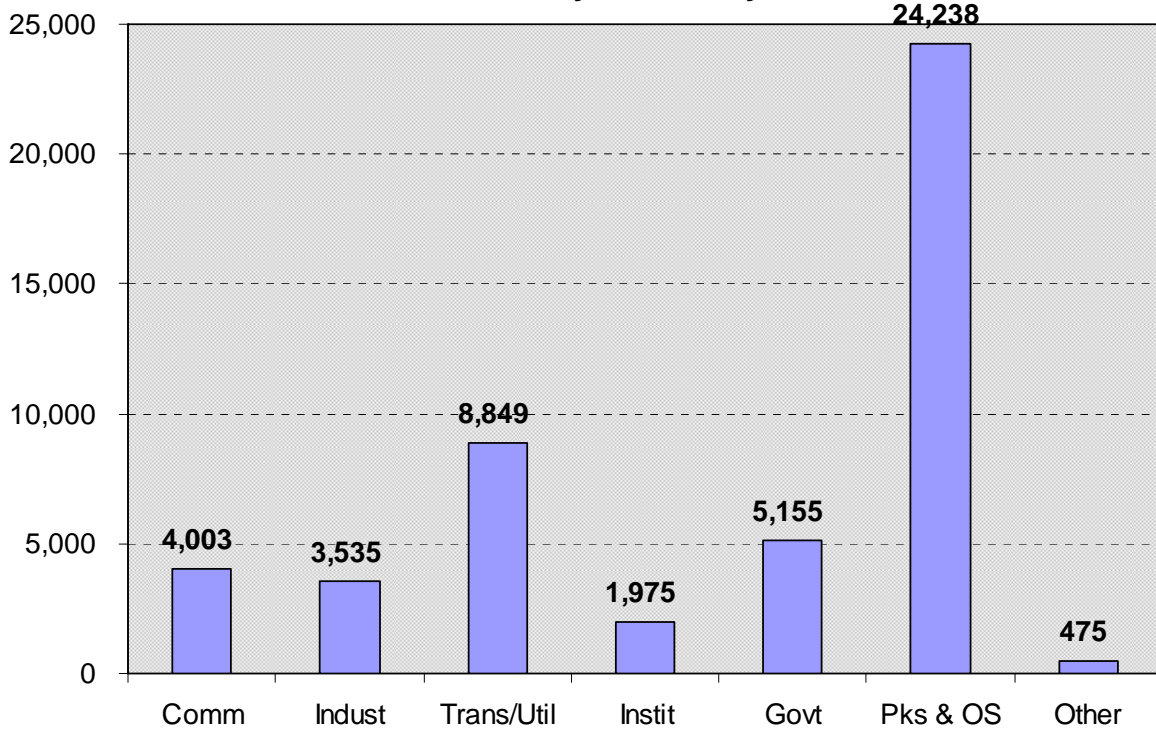
<sup>4</sup> This includes road and utility (power lines) rights of way.

<sup>5</sup> Other includes fairgrounds, quarries and junk yards. They are classified this way primarily because they general little employment relative to their size.

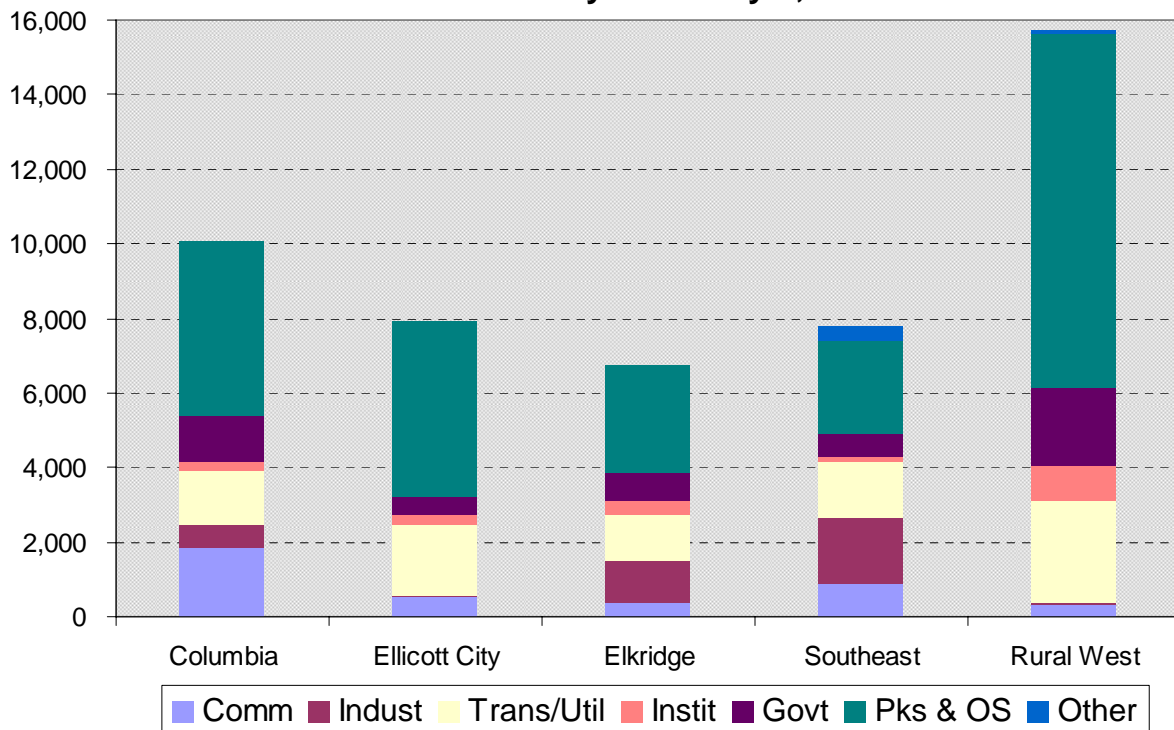
**Non-Residential Acreage Distribution by Stage and Type - January 1, 2006  
Existing Acres as of January 1, 2006 & In-Process Acres as of March 24, 2006**

		Comm	Indust	Trans/Util	Instit	Govt	Pks & OS	Other	Total	Percent
<b>Columbia</b>	Existing	1,860	581	1,457	269	1,237	4,642	18	10,065	95.0%
	Signed	44	11	0	0	0	0	0	55	0.5%
	In-Process	143	65	0	0	0	0	0	209	2.0%
	Undeveloped	150	102	0	0	14	0	0	266	2.5%
	<b>Total</b>	<b>2,197</b>	<b>759</b>	<b>1,457</b>	<b>269</b>	<b>1,252</b>	<b>4,642</b>	<b>18</b>	<b>10,594</b>	<b>100.0%</b>
<b>Ellicott City</b>	Existing	519	48	1,910	270	445	4,739	0	7,931	95.8%
	Signed	14	11	0	0	15	0	0	41	0.5%
	In-Process	19	0	0	0	0	0	0	19	0.2%
	Undeveloped	214	48	0	0	29	0	0	291	3.5%
	<b>Total</b>	<b>767</b>	<b>107</b>	<b>1,910</b>	<b>270</b>	<b>489</b>	<b>4,739</b>	<b>0</b>	<b>8,282</b>	<b>100.0%</b>
<b>Elkridge</b>	Existing	391	1,103	1,244	363	752	2,875	0	6,728	87.7%
	Signed	26	81	0	0	0	0	0	106	1.4%
	In-Process	18	75	0	0	0	2	0	95	1.2%
	Undeveloped	60	680	0	0	1	0	0	741	9.7%
	<b>Total</b>	<b>495</b>	<b>1,938</b>	<b>1,244</b>	<b>363</b>	<b>754</b>	<b>2,877</b>	<b>0</b>	<b>7,671</b>	<b>100.0%</b>
<b>Southeast</b>	Existing	884	1,758	1,506	153	615	2,510	345	7,771	91.6%
	Signed	61	57	0	0	0	0	11	129	1.5%
	In-Process	5	17	0	0	0	0	0	22	0.3%
	Undeveloped	228	329	0	0	0	0	0	558	6.6%
	<b>Total</b>	<b>1,178</b>	<b>2,162</b>	<b>1,506</b>	<b>153</b>	<b>615</b>	<b>2,510</b>	<b>355</b>	<b>8,479</b>	<b>100.0%</b>
<b>Rural West</b>	Existing	349	45	2,732	919	2,106	9,473	112	15,737	98.8%
	Signed	2	0	0	0	42	0	0	44	0.3%
	In-Process	0	0	0	0	9	22	0	31	0.2%
	Undeveloped	121	0	0	0	0	0	0	121	0.8%
	<b>Total</b>	<b>472</b>	<b>46</b>	<b>2,732</b>	<b>919</b>	<b>2,157</b>	<b>9,495</b>	<b>112</b>	<b>15,932</b>	<b>100.0%</b>
<b>Coutywide</b>	Existing	4,003	3,535	8,849	1,975	5,155	24,238	475	48,231	94.6%
	Signed	147	160	0	0	57	0	11	374	0.7%
	In-Process	185	157	0	0	9	24	0	375	0.7%
	Undeveloped	774	1,159	0	0	45	0	0	1,978	3.9%
	<b>Total</b>	<b>5,109</b>	<b>5,011</b>	<b>8,849</b>	<b>1,975</b>	<b>5,266</b>	<b>24,262</b>	<b>486</b>	<b>50,958</b>	<b>100.0%</b>

**Existing Developed Non-Residential Acres by Type  
Howard County - January 1, 2006**

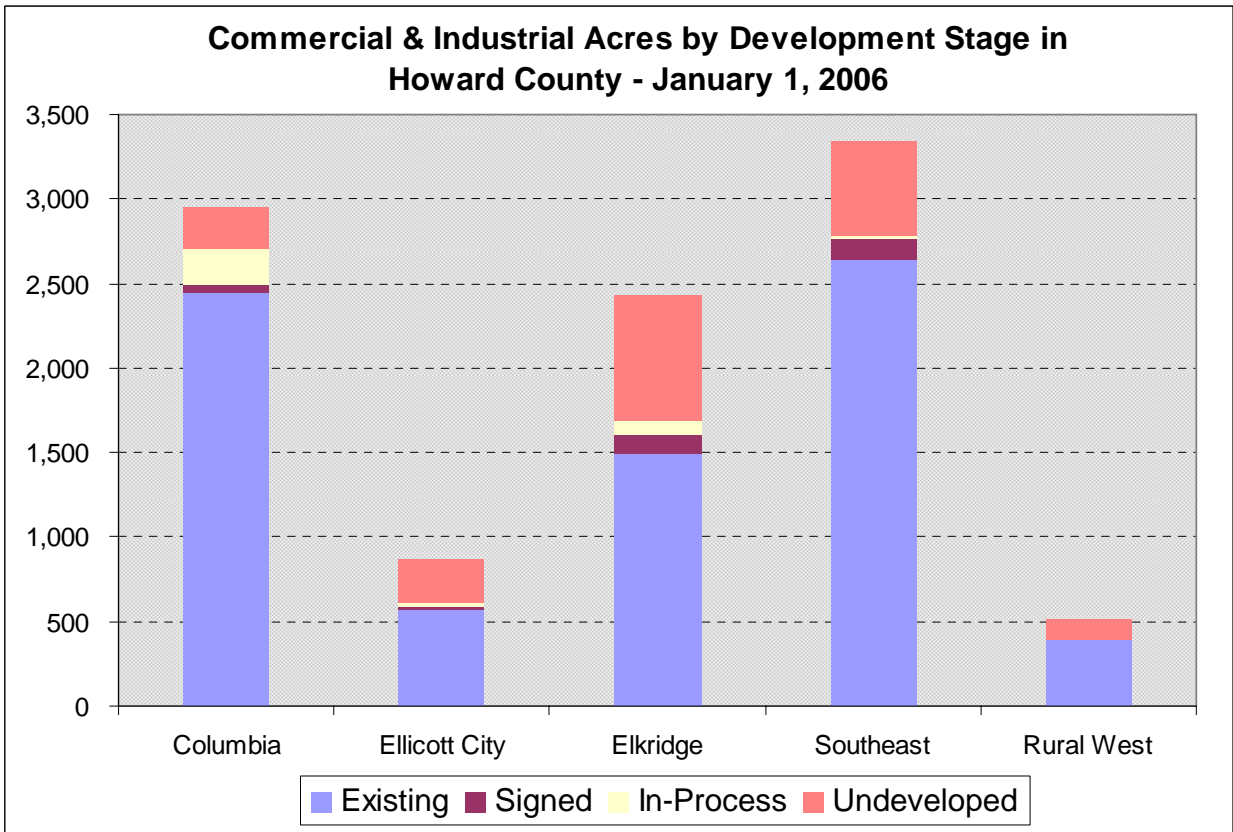
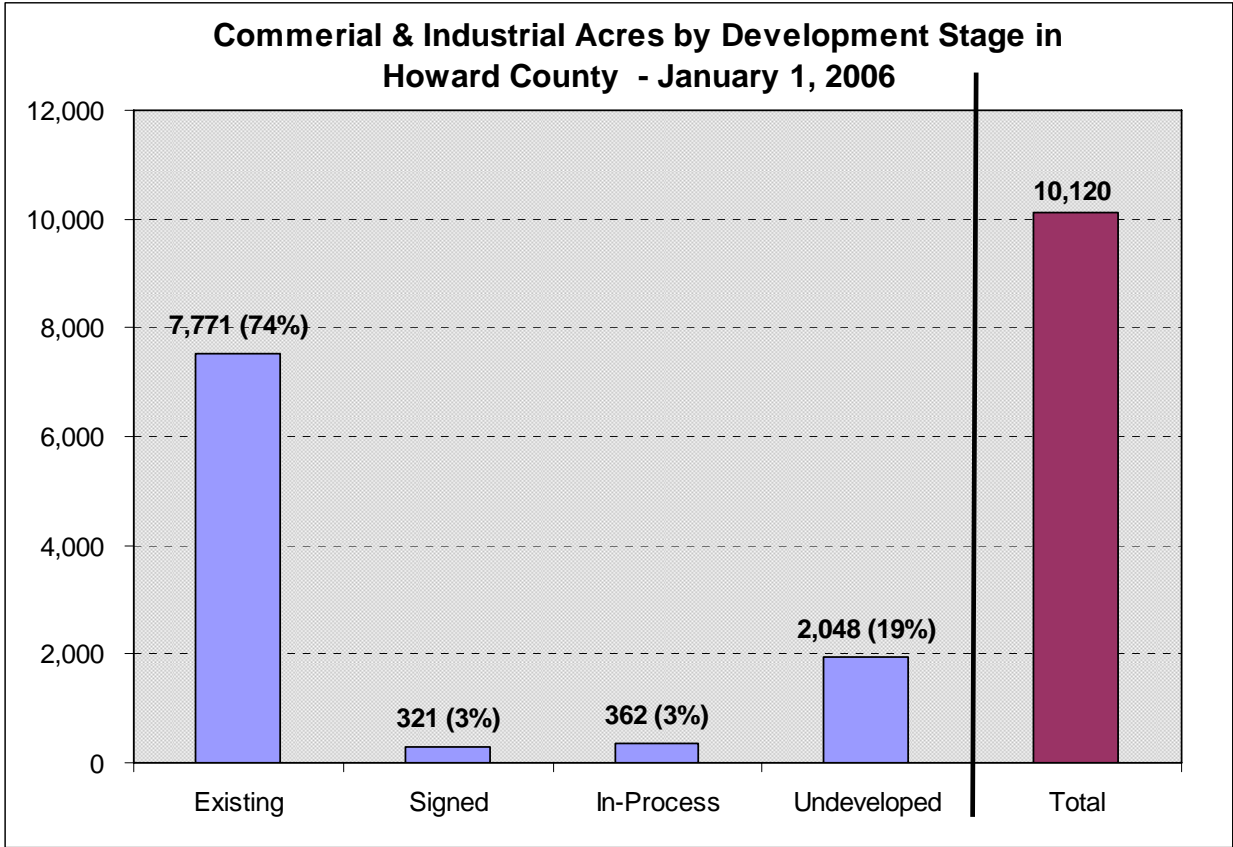


**Existing Developed Non-Residential Acres by Planning Area  
Howard County - January 1, 2006**



**Commercial & Industrial Acreage Distribution by Stage and Type - January 1, 2006  
Not Including Transportation & Utilities**

		<b>Comm</b>	<b>Indust</b>	<b>Total</b>	<b>Percent</b>
<b>Columbia</b>	Existing	1,860	581	2,441	82.6%
	Signed	44	11	55	1.9%
	In-Process	143	65	209	7.1%
	Undeveloped	150	102	252	8.5%
	<b>Total</b>	<b>2,197</b>	<b>759</b>	<b>2,956</b>	<b>100.0%</b>
		<b>Comm</b>	<b>Indust</b>	<b>Total</b>	<b>Percent</b>
<b>Ellicott City</b>	Existing	519	48	567	65.0%
	Signed	14	11	25	2.9%
	In-Process	19	0	19	2.2%
	Undeveloped	214	48	262	30.0%
	<b>Total</b>	<b>767</b>	<b>107</b>	<b>873</b>	<b>100.0%</b>
		<b>Comm</b>	<b>Indust</b>	<b>Total</b>	<b>Percent</b>
<b>Elkridge</b>	Existing	391	1,103	1,494	61.4%
	Signed	26	81	106	4.4%
	In-Process	18	75	92	3.8%
	Undeveloped	60	680	740	30.4%
	<b>Total</b>	<b>495</b>	<b>1,938</b>	<b>2,433</b>	<b>100.0%</b>
		<b>Comm</b>	<b>Indust</b>	<b>Total</b>	<b>Percent</b>
<b>Southeast</b>	Existing	884	1,758	2,642	79.1%
	Signed	61	57	118	3.5%
	In-Process	5	17	22	0.7%
	Undeveloped	228	329	558	16.7%
	<b>Total</b>	<b>1,178</b>	<b>2,162</b>	<b>3,340</b>	<b>100.0%</b>
		<b>Comm</b>	<b>Indust</b>	<b>Total</b>	<b>Percent</b>
<b>Rural West</b>	Existing	349	45	394	76.1%
	Signed	2	0	2	0.5%
	In-Process	0	0	0	0.0%
	Undeveloped	121	0	121	23.4%
	<b>Total</b>	<b>472</b>	<b>46</b>	<b>518</b>	<b>100.0%</b>
		<b>Comm</b>	<b>Indust</b>	<b>Total</b>	<b>Total</b>
<b>Coutywide</b>	Existing	4,003	3,535	7,539	74.5%
	Signed	147	160	307	3.0%
	In-Process	185	157	342	3.4%
	Undeveloped	774	1,159	1,933	19.1%
	<b>Total</b>	<b>5,109</b>	<b>5,011</b>	<b>10,120</b>	<b>100.0%</b>

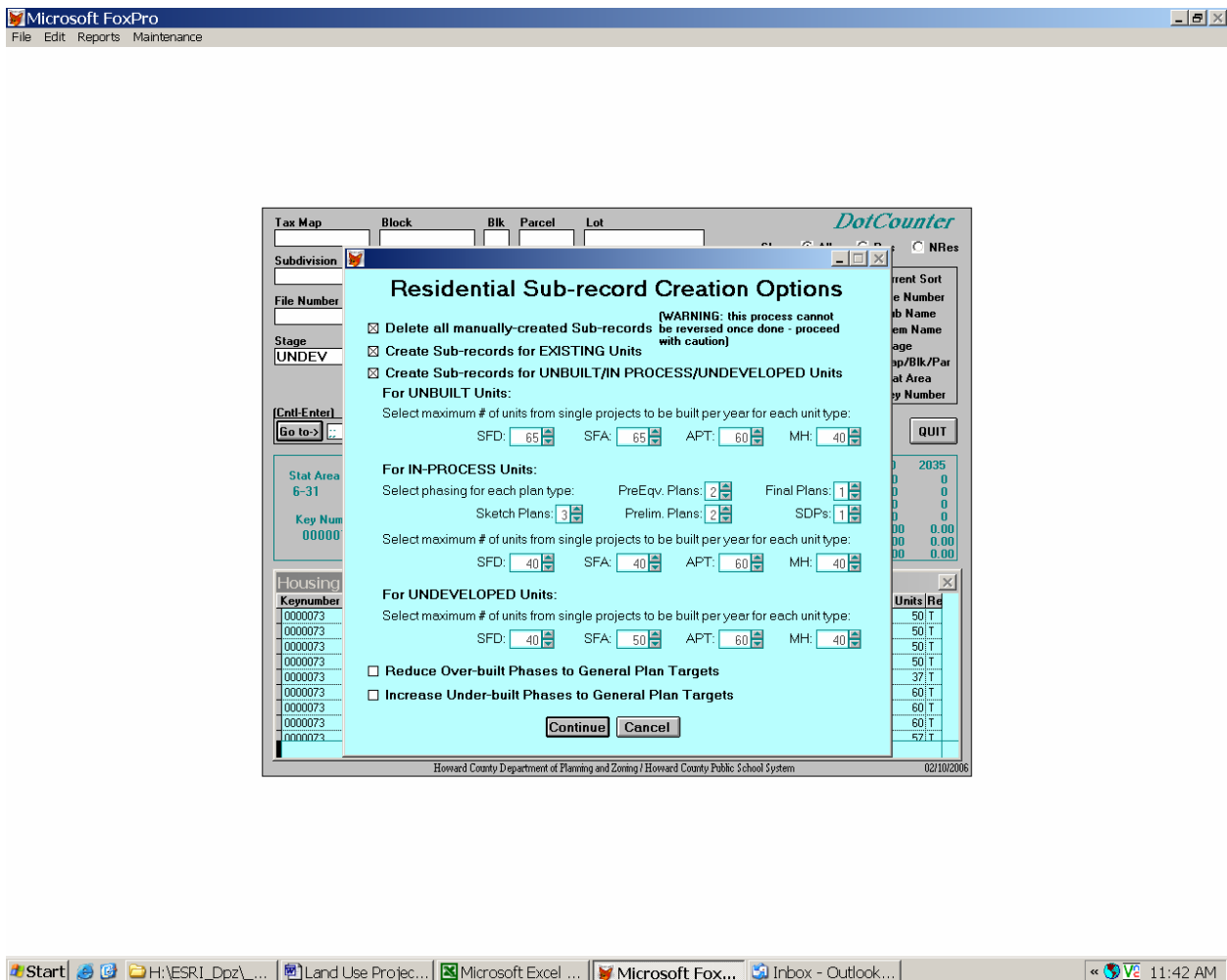


# Land Use Projection Model

As indicated earlier the land use projection model was developed in FoxPro by a programmer with the Howard County Public School System. The model imports the land use dots and then is used independently to develop the projections. Prior to importing the dots, a spatial join must be conducted within the GIS environment to further attribute the data with the three polygon layers shown on the map the introduction of this report (Page 1). Each dot will therefore have as attributes its associated sewer shed, water pressure zone, transportation analysis zone and school polygon. The model can easily be expanded to include other areas as well if future needs arise.

## Residential Projections

Projecting future residential units is a simple and transparent process. Unbuilt units from recently recorded plats are projected first over time, followed by in process units and then undeveloped units. The maximum number of units per plan or per undeveloped parcel can be set by the user. For example, if a land use record has 100 single family units in process on a large parcel, and the maximum number of units allowed is 40, then this project is spread out over three years representing a more realistic outcome – 40 in the first year, followed by another 40 the next year and then the remaining 20 in the third year. The image below displays the model options.



For in process units, the initial year the units are first built can also be established by the user. This can vary by plan stage. For example, sketch plans (the initial plan submission) can be set so that the associated units are built beginning 3 years out. Units in final plans, on the other hand, will be built sooner in year 1.

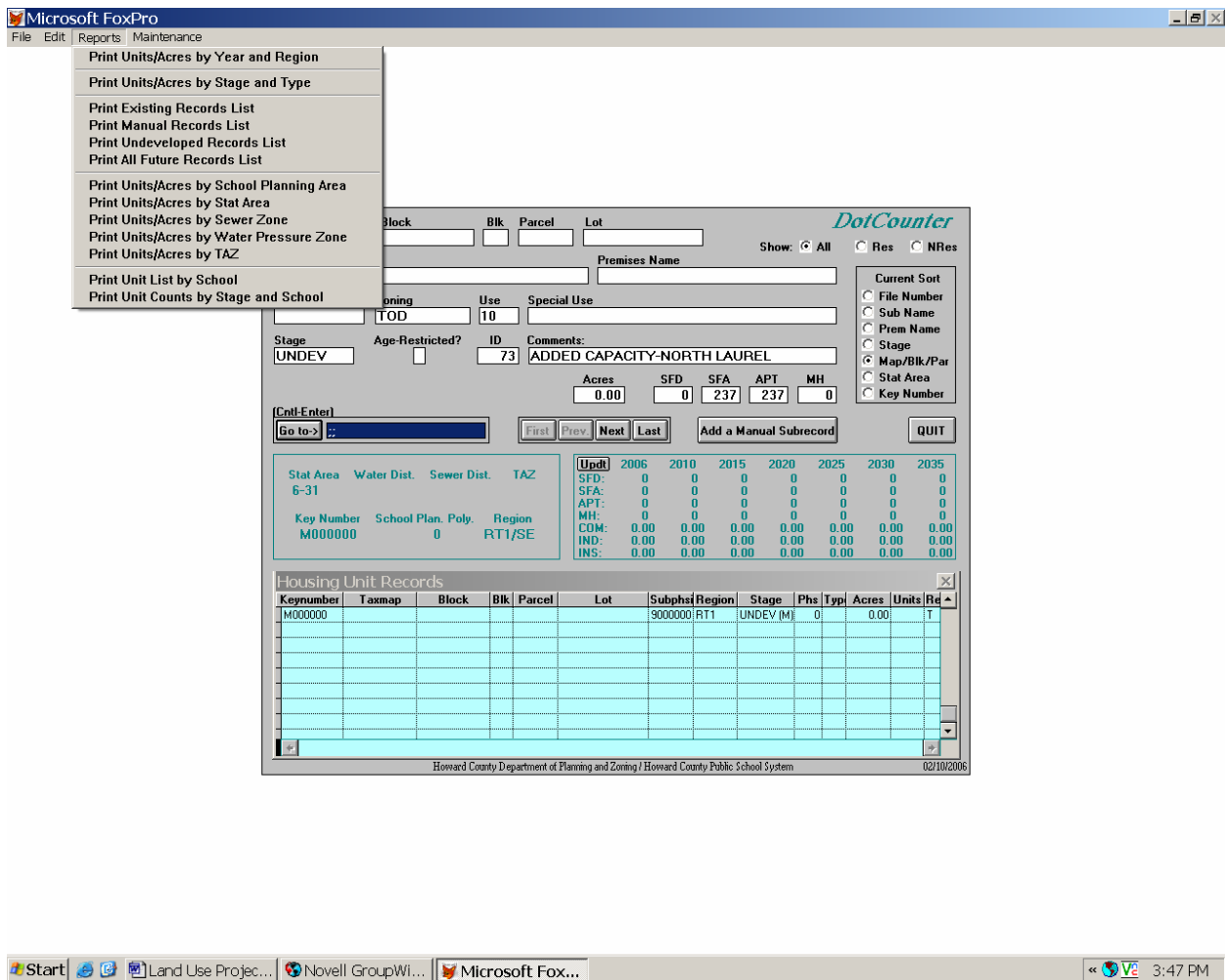
After these initial rules are followed, then the results are adjusted to match General Plan control totals by planning area (image below). These control totals can also be set by the user. During this control total matching process all of the undeveloped units are randomly built over time to achieve the control totals.<sup>6</sup> In this way, the known data such as unbuilt lots on recent plats and in process plans are built first over time followed by undeveloped land all controlled to the General Plan projections (which are the basis of the County's APFO housing unit allocations).

The screenshot shows a Microsoft FoxPro application window titled "General Plan Allocation Limits - Press Ctrl-End to save; Esc to cancel". The window contains a data table with the following columns: Year, Phase, Elk\_gptot, Col\_gptot, Se\_gptot, West\_gptot, Ec\_gptot, Sre\_gptot, Rtl\_gptot, Elk\_gpacr, Col\_gpacr, Se\_gpacr, West\_gpacr, Ec\_gpacr. The data spans from Year 2005 to 2020. An "Housing" dialog box is open in the foreground, titled "For UNDEVELOPED Units:". It contains a list of "Keynumber" entries (all 0000073) and a "Units/Bd" list (50, 50, 50, 50, 50, 37, 60, 60, 60, 60, 57). The dialog also includes input fields for SFD (40), SFA (50), APT (60), and MH (40), and two checkboxes: "Reduce Over-built Phases to General Plan Targets" (unchecked) and "Increase Under-built Phases to General Plan Targets" (unchecked). Buttons for "Continue" and "Cancel" are at the bottom. The footer of the dialog reads "Howard County Department of Planning and Zoning / Howard County Public School System" and "02/10/2006".

<sup>6</sup>Unbuilt units on older plats as well as those that have no associated plat that are on smaller parcels (less than 6 acres in the Rural West and less than 0.5 acres in the east) also get randomized with the undeveloped units rather than built initially. The rationale of this is that if an older unbuilt lot recorded 20 years ago is still not built, its not unlike undeveloped land in that know one really knows when it will be built upon.

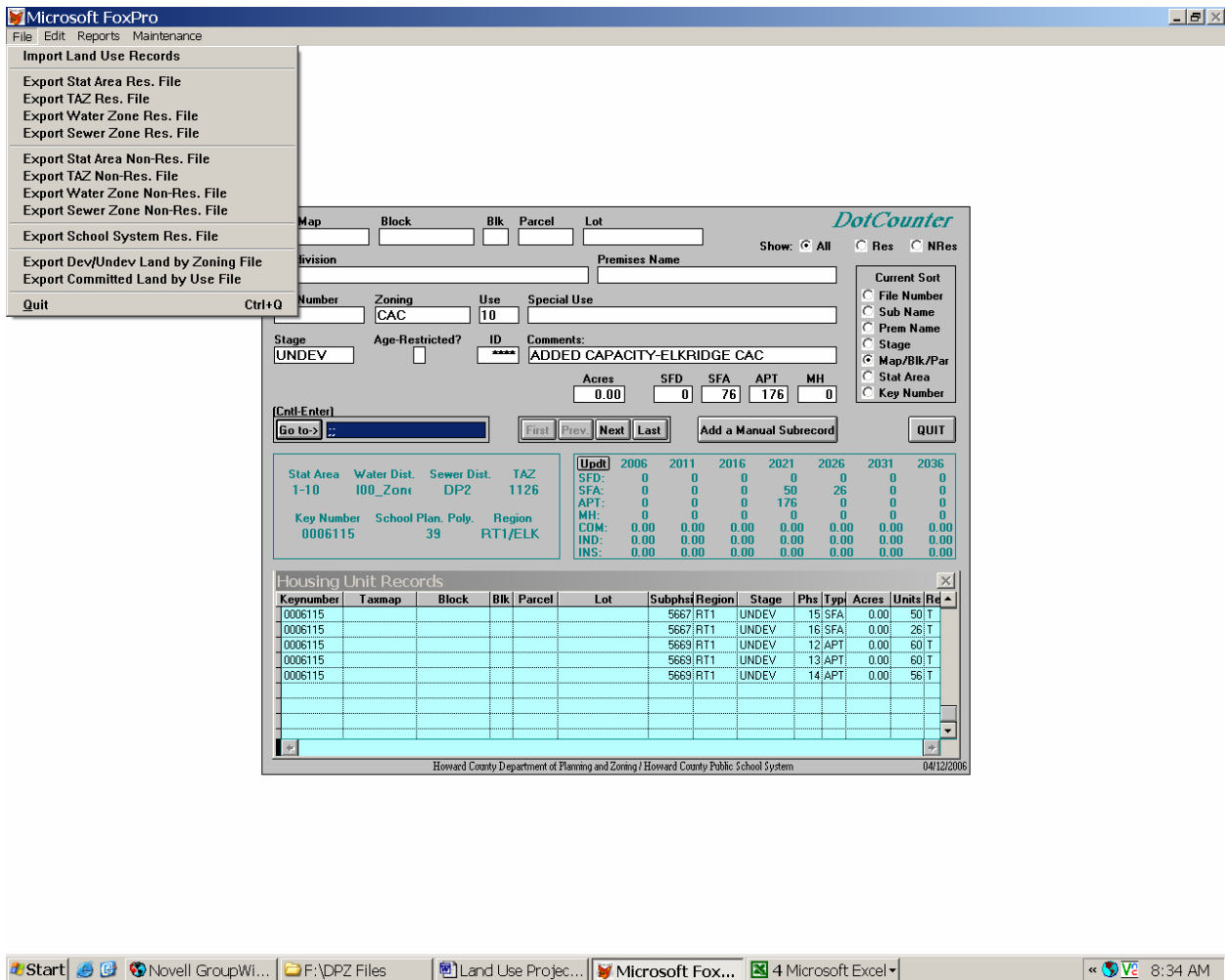
The model also includes the ability to manually project units for any land use record. Once manual projections are created, they do not change, and the units in the remaining records are projected around them. A primary use of manual projections is for known phased subdivisions. For example, a large subdivision in the Southeast part of the County called Maple Lawn Farms has known phasing of about 100 units per year for the next 8 years. Rather than the model projecting these units based on the established rules, they can be directly entered. Manual records are also useful when projects are held up because APFO allocations are not available. For example, subdivisions in ElkrIDGE are currently in a holding pattern with those at the end of the waiting list on hold as far out as 2012.

Once all manual records are created, the general plan control totals are established, and the projection rules are created, the model automatically and quickly projects the units.<sup>7</sup> The results can be displayed in various summary and detailed reports. The information can also be exported as text delineated data allowing importation into spreadsheets. The data in the tables and charts shown earlier starting on Page 11 depicting existing conditions are some examples of exports. The report and export option drop down menus are shown in the following two images.



<sup>7</sup> Run time is about 5 minutes using a relatively fast computer (Pentium 4, 3.0 GHz)





The tables below are some sample of residential projection outputs. The first table is a summary of future development in the County showing the number of units built per year by Planning Area including the Route 1 Set-Aside and Senior East areas.<sup>8</sup> Based on the established control totals, “buildout” is anticipated to occur in 2028.

Another detailed report can be created listing all parcels or lots that make up the projected units. This report is more than 80 pages. A sample is shown in the second table below which outlines the 63 units built in Columbia in year 1. Location information (tax map, block, parcel, and lot) as well as subdivision name, stage, file number, zoning and units by type are all shown. This way outputs can be reviewed to see if they make sense. If needed, adjustments can easily be made by changing the projection criteria and manual record inputs and then running the model again. Note in the example below all the unbuilt units from recent recorded plans are built in the first year.

<sup>8</sup> APFO includes annual allocations for age-restricted units in the eastern part of the County and Route 1 Corridor units as part of the Route 1 revitalization effort (units east of I-95 that are part of mixed use plans).

Residential Unit Distribution by Year and Region

Year	Phase	Elkridge	Columbia	Southeast	Rural West	Ellicott City	Senior-East	Route 1	Total
2006	0	12758	39029	13421	12907	21563	1606	157	101441
2007	1	250	63	302	250	348	257	0	1470
2008	2	255	213	302	250	348	277	292	1937
2009	3	253	113	342	250	348	267	383	1956
2010	4	250	173	302	250	353	275	309	1912
2011	5	200	220	302	250	348	263	286	1869
2012	6	180	158	320	250	358	251	350	1867
2013	7	180	158	320	250	358	254	269	1789
2014	8	214	104	320	250	358	258	290	1794
2015	9	180	110	320	250	358	223	265	1706
2016	10	180	110	320	250	358	239	250	1707
2017	11	180	110	300	250	269	179	248	1536
2018	12	168	110	300	250	269	102	240	1439
2019	13	167	110	300	250	269	77	250	1423
2020	14	167	110	300	250	269	40	240	1376
2021	15	167	110	270	250	114	11	249	1171
2022	16	144	110	270	250	65	0	196	1035
2023	17	12	110	270	250	6	0	184	832
2024	18	0	110	205	250	0	0	157	722
2025	19	0	110	102	250	0	0	67	529
2026	20	0	110	6	250	0	0	0	366
2027	21	0	110	0	33	0	0	0	143
2028	22	0	20	0	0	0	0	0	20
<b>Totals</b>		<b>15905</b>	<b>41681</b>	<b>18894</b>	<b>17940</b>	<b>26359</b>	<b>4579</b>	<b>4682</b>	<b>130036</b>

Residential Unit Listing by Region and Year

Region: COL

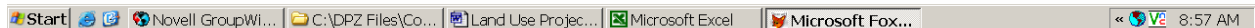
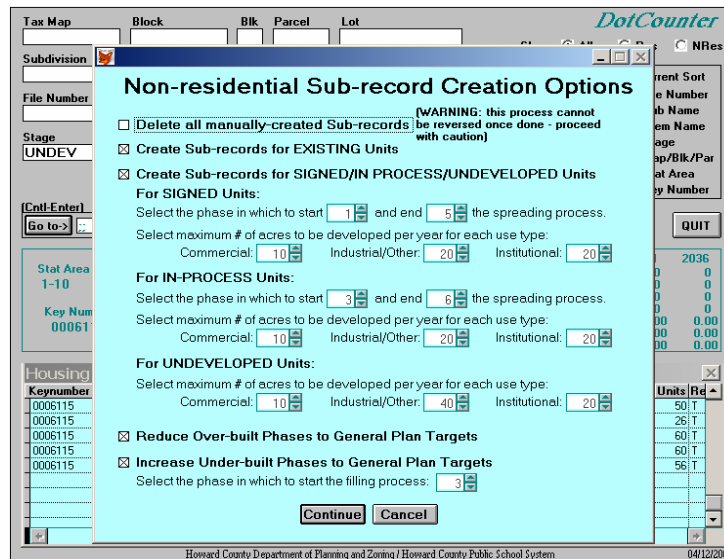
Phase 1 - 2006

Key #	Map/Block/Blk/Parcel/Lot	Subdivision	Stage	File #	Age Res	Zoning	Sub ID	Stat Area	Units	Type
0035052	30/13/D/133/26	BEAVERBROOK	UNBLT	F-93-046	R-20		29561	5-08A	1	SFD
0044944	35/14//65/	CRICKET CREEK	UNBLT	F-05-043	R-ED		38177	5-05	8	SFD
0053801	36/19//56/2	DAVID N ELLIOTT II PROPERTY	UNBLT	F-04-138	R-20		44960	6-06	1	SFD
0053805	36/19//56/3	DAVID N ELLIOTT II PROPERTY	UNBLT	F-04-138	R-20		44962	6-06	1	SFD
0041290	34/12//37/5	DORIS JOHNSON PROPERTY	UNBLT	F-05-041	R-12		34895	5-05	1	SFD
0041292	34/12//37/6	DORIS JOHNSON PROPERTY	UNBLT	F-05-041	R-12		34897	5-05	1	SFD
0045076	36/8,14//315/2	DUGGAN PROPERTY	UNBLT	F-05-036	R-20		38283	6-03	1	SFD
0039236	30/20//238/3	EDITH M. RALSTON PROPERTY	UNBLT	F-03-110	R-20		33171	5-08B	1	SFD
0044302	29/20//320/	GILL PROPERTY	UNBLT	F-03-181	R-20		37599	5-05	4	SFD
0045569	35/12//178/1	HICKERY POINT	UNBLT	F-04-170	R-20		38704	5-13A	1	SFD
0045665	35/12//178/2	HICKERY POINT	UNBLT	F-04-170	R-20		38793	5-13A	1	SFD
0045666	35/12//178/3	HICKERY POINT	UNBLT	F-04-170	R-20		38794	5-13A	1	SFD
0045667	35/12//178/4	HICKERY POINT	UNBLT	F-04-170	R-20		38795	5-13A	1	SFD
0045668	35/12//178/5	HICKERY POINT	UNBLT	F-04-170	R-20		38796	5-13A	1	SFD
0045669	35/12//178/6	HICKERY POINT	UNBLT	F-04-170	R-20		38797	5-13A	1	SFD
0045670	35/12//178/7	HICKERY POINT	UNBLT	F-04-170	R-20		38798	5-13A	1	SFD
0051830	36/16//68/E-3	IRVIN DASHER SUBDIVISION	UNBLT	F-01-139	R-12		43284	6-07A	1	SFD
0051831	36/16//68/E-4	IRVIN DASHER SUBDIVISION	UNBLT	F-01-139	R-12		43285	6-07A	1	SFD
0048840	35/23//118/2	JOHNSON PROPERTY	UNBLT	F-05-046	R-20		41168	5-16B	1	SFD
0045573	35/12/B/179/1	NEWMAN PROPERTY	UNBLT	F-04-065	R-20		38708	5-13A	1	SFD
0059449	42/17//68/	OAKLAND MILLS PROPERTY	INF	SDP-06-11	R-SA-8		49523	6-16	13	SFA
0045762	36/7//113/51	OWEN BROWN WOODS, 1/2	UNBLT	F-86-204	R-20		38881	5-13A	1	SFD
0044149	35/20//435/32	SCOTT FARM	UNBLT	F-04-061	R-20		37470	5-05	1	SFD
0044151	35/20//435/34	SCOTT FARM	UNBLT	F-04-061	R-20		37472	5-05	1	SFD
0044152	35/20//435/35	SCOTT FARM	UNBLT	F-04-061	R-20		37473	5-05	1	SFD
0054377	42/10//47/2	SOUTHERN HOMES	UNBLT	F-04-014	R-12		45362	6-12A	1	SFD
0052415	37/20//471/2	SUBDIVISION OF DONHAM	UNBLT	F-04-025	R-12		43746	6-10	1	SFD
0041506	35/20//342/4	TROTTERS RUN	UNBLT	F-05-012	R-20		35096	5-05	11	SFD
0048647	36/8//315/188	VILLAGE OF OAKLAND MILLS	UNBLT	F-69-023	NT		41000	6-03	1	SFD
0048297	36/4//123/	WODE PROPERTY	UNBLT	F-05-035	R-12		40671	6-03	2	SFD
<b>Phase 1 total:</b>									<b>63</b>	

Other outputs include summaries at five year increments by particular geographies. These geographies include transportation analysis zones, DPZ statistical areas, water pressure zones, sewer service areas, and school polygons and districts. Altogether, there are 24 reports and data exports built in to the projection system. For all of the reports, there are multiple options for the data reported, such as by specific planning areas (or school districts) and for a specific range of years.<sup>9</sup> The user can also specify between residential and nonresidential reports. The nonresidential projections are discussed below.

### Nonresidential Projections

Projecting nonresidential land uses is similar to the residential projections. Rather than projecting units, the nonresidential projections are based on future *acres* by three categories: 1) commercial, industrial, and 3) government & institutional. Acres of signed site development plans are projected first, followed by in process plans. Various criteria can be entered into the model to dictate how the projections proceed. This includes the range of years over which the projects are developed as well as the amount of acreage developed for each project per year. Finally, undeveloped acres are then randomly developed over time. Similar to the residential projections, nonresidential acreage control totals can be established that the model controls and smooths to.



<sup>9</sup> The model also has the capability to project units by school district (elementary, middle and high) based on the school district boundaries of given school year going back as far as four years as well as proposed or adopted redistricting plans for a future year. It does this by making use of school planning polygons.

Future nonresidential acreage projections are used primarily for water and sewer master planning efforts. For transportation planning, future retail and non-retail employees are used. This is done by making use of a custom data export from the model that projects the development of future non-residential acreage *by zoning* for each transportation analysis zone (TAZ). A sample of this output is shown below. There are 149 TAZ's and projections continue to the year 2035, by which time there is no more nonresidential land left based on the annual control totals.

TAZ	Zoning	2005			2005 to 2010			2010 to 2015			2015 to 2020		
		Ind	Com	Inst	Ind	Com	Inst	Ind	Com	Inst	Ind	Com	Inst
1003 B-1		0	1.9	0	0	0	0	0	0	0	0	1.07	0
1003 B-2		0	2.82	0	0	0	0	0	0	0	0	0	0
1003 BR		0	0	0	0	0	0	0	0	0	0	0	0
1003 M-1		0	3.75	0	0	0	0	0	0	0	0	0	0
1003 RC-DEO		0	50.02	0	0	0	0	0	0	0	0	0	0
1004 B-2		0	23.56	0	0	4.82	0	0	0	0	0	0	0
1004 BR		0	0	0	0	4.59	0	0	0	0	0	0	0
1004 RC-DEO		0	0	0	0	0	0	0	0	0	0	0	0
1004 RC-DEO		0.07	3.1	0	0	0	0	0	0	8.74	0	0	0
1005 B-2		0	4.09	0	0	1.2	0	0	0	0	0	0	0
1005 RC-DEO		0	1.97	0	0	0	0	0	0	0	0	0	0
1006 B-1		0	3.44	0	0	0	0	0	0	0	0	0	0
1006 B-2		0.41	9.26	0	0	0.5	0	0	0	0	0	0	0
1006 RC-DEO		0	24.46	0	0	0	0	0	0	0	0	0	0
1007 B-1		0	2.87	0	0	0	0	0	0	0	0	0	0
1007 B-2		0	2.73	0	0	2.73	0	0	0	0	0	0	0
1007 BR		0	2.64	0	0	0	0	0	0	0	0	11.26	0
1007 RC-DEO		0	16.7	0	0	0	0	0	0	0	0	0	0
1007 RR-DEO		0	67	0	0	0	0	0	0	0	0	0	0
1008 B-2		0	8.4	0	0	0	0	0	0	0	0	1.98	0
1008 RC-DEO		0	1.7	0	0	0	0	0	0	0	0	0	0
1009 RC-DEO		0	3.89	0	0	0	0	0	0	0	0	0	0
1009 RR-DEO		0	0	0	0	0	0	0	0	0	0	0	0
1010 B-1		0	0	0	0	1.32	0	0	0	0	0	0	0
1010 B-2		23.26	18.07	0	0	0	0	0	2.41	0	0	0	0
1010 POR		0	0	0	0	0	0	0	0	0	0	21.85	0
1010 RC-DEO		67.37	0	0	0	0	0	0	0	0	0	0	0
1010 RR-DEO		0	0	0	0	0	0	0	0	0	0	0	0
1011 B-2		10.61	5.43	0	0	0	0	0	0	0	0	6.8	0
1011 POR		0	0	0	0	0	0	0	0	0	0	0	0
1011 RC-DEO		0	3	0	0	0	0	0	0	0	0	0	0
1011 RR-DEO		0	0	0	0	0	0	0	0	0	0	0	0
1012 B-1		0	0	0	0	0	0	0	0	0	0	0	0
1012 B-2		2.83	0	0	0	0	0	0	0	0	0	0	0
1012 M-1		0.64	0	0	0.36	0	0	0	0	0	0	0	0
1012 R-ED		0	0	0	0	0	0	0	0	0	0	0	0
1012 RC-DEO		16.75	0.96	0	0	0	0	0	0	0	0	0	0
1012 RR-DEO		0	0	0	0	0	0	0	0	0	0	0	0
1013 B-1		0	6.42	0	0	0	0	0	1.05	0	0	0	0
1013 PEC		0	19.97	0	6.43	0	0	6.72	0	0	5.02	0	0

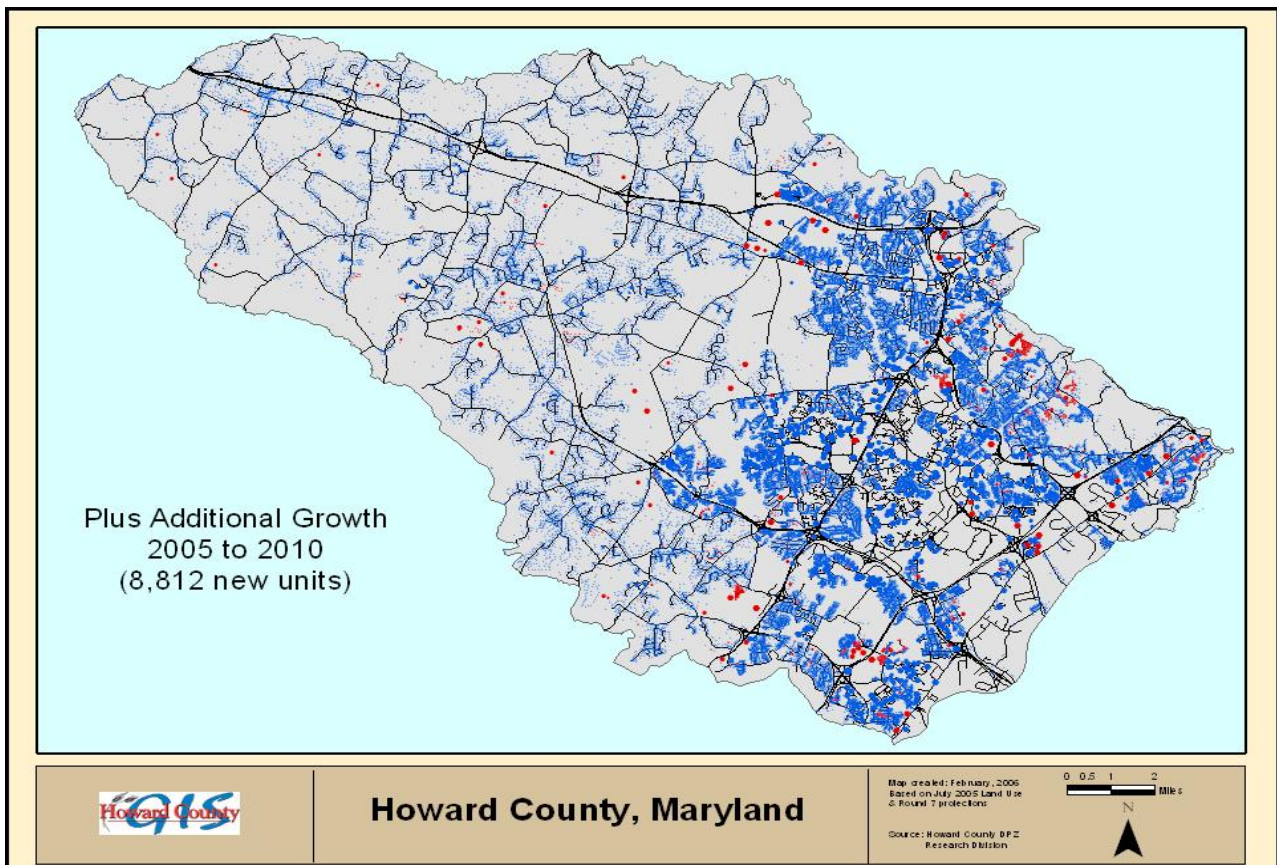
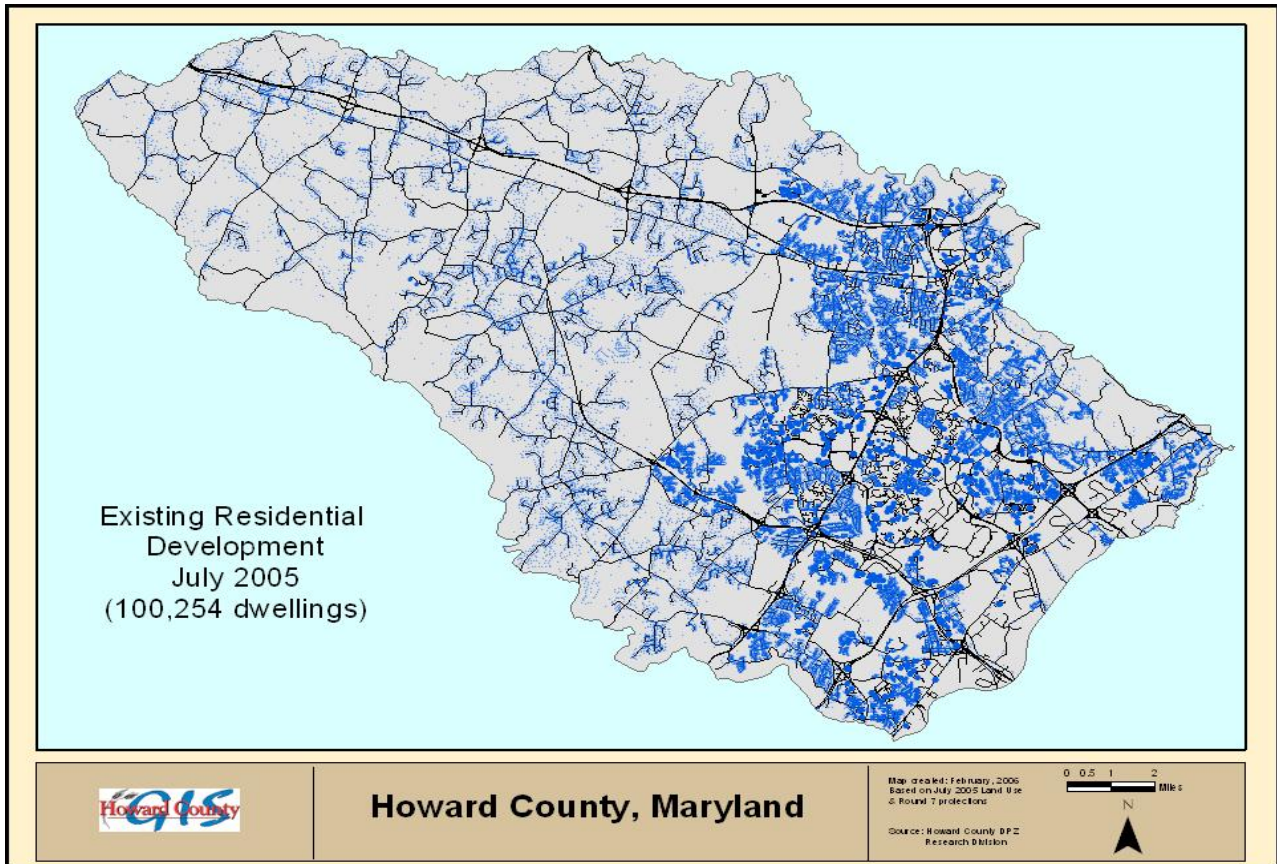
The next step is to project retail and non-retail employment based on average employee per acre factors by zoning that were derived by analyzing recently approved and in-process site development plans. A subsequent spreadsheet model has been developed that does this. This model also incorporates known projects and special assumptions, such as redevelopment projects that will intensify or re-build upon existing older development. It is expected that these types of projects will grow, particularly along the Route 1 Corridor as the revitalization effort continues to gain momentum there. The resulting employee estimates are then known for each TAZ. All of this can be controlled to the General Plan employment growth targets. It is an iterative process where the projection model can be re-run using new acreage control totals to produce the desired General Plan employment control totals. The final employee projections output by TAZ (sample) is shown below.

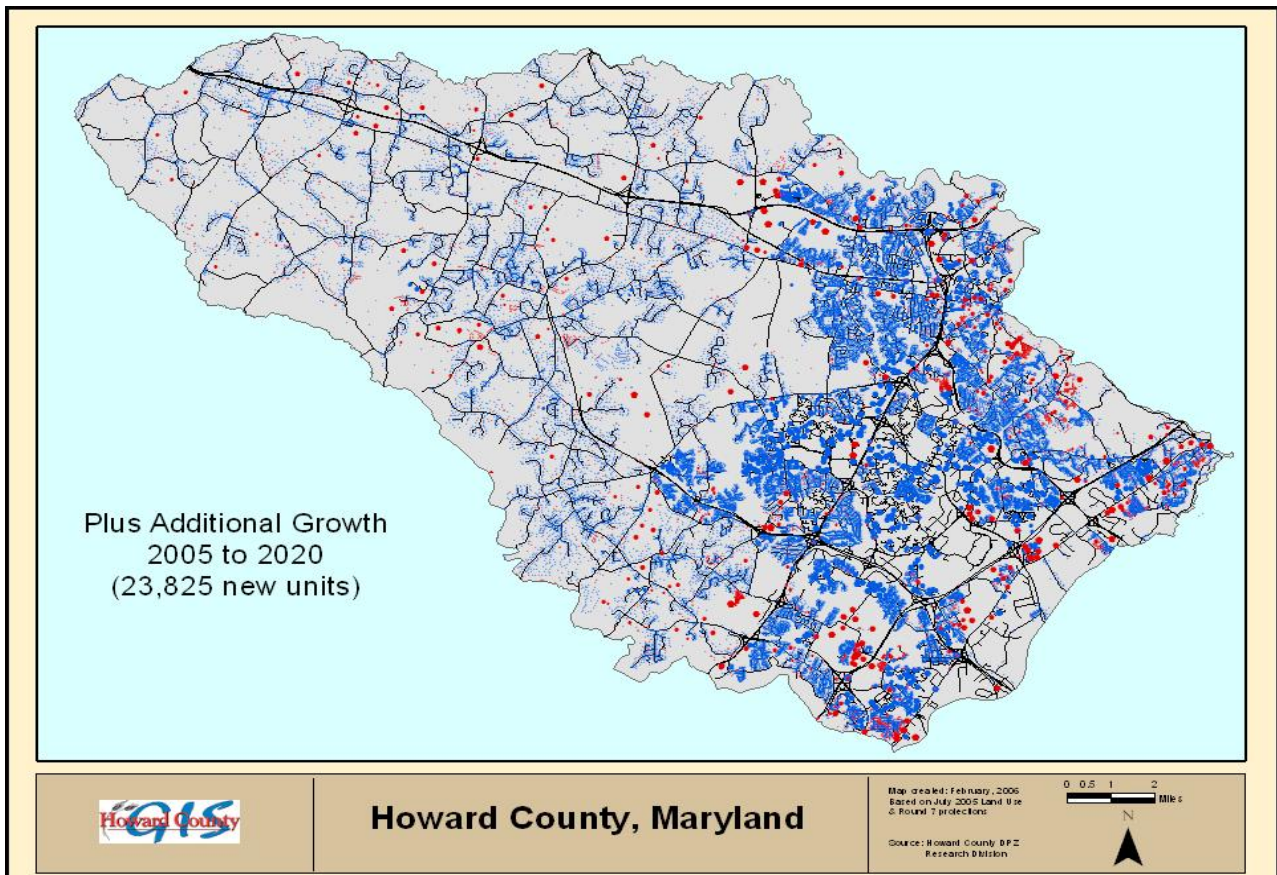
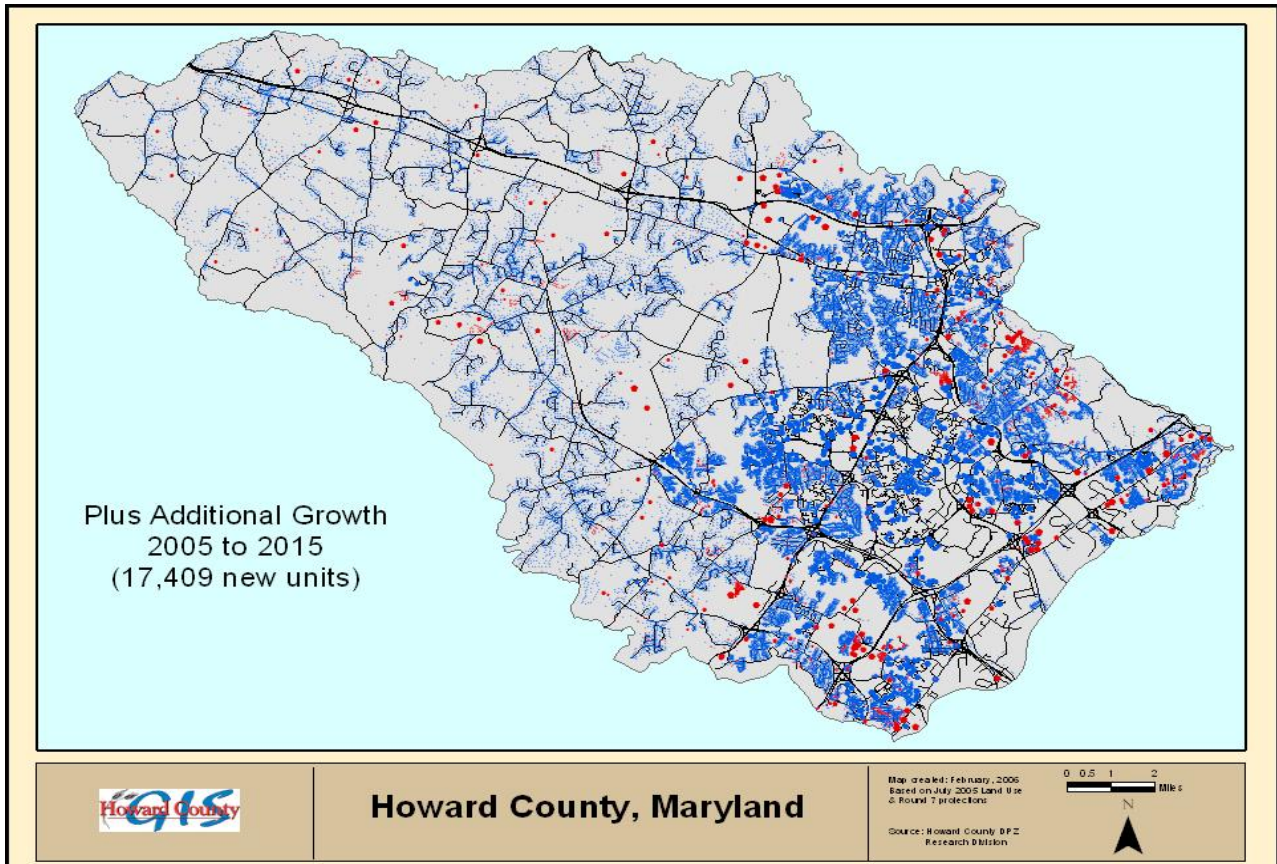
**Employment Projections  
March, 2006**

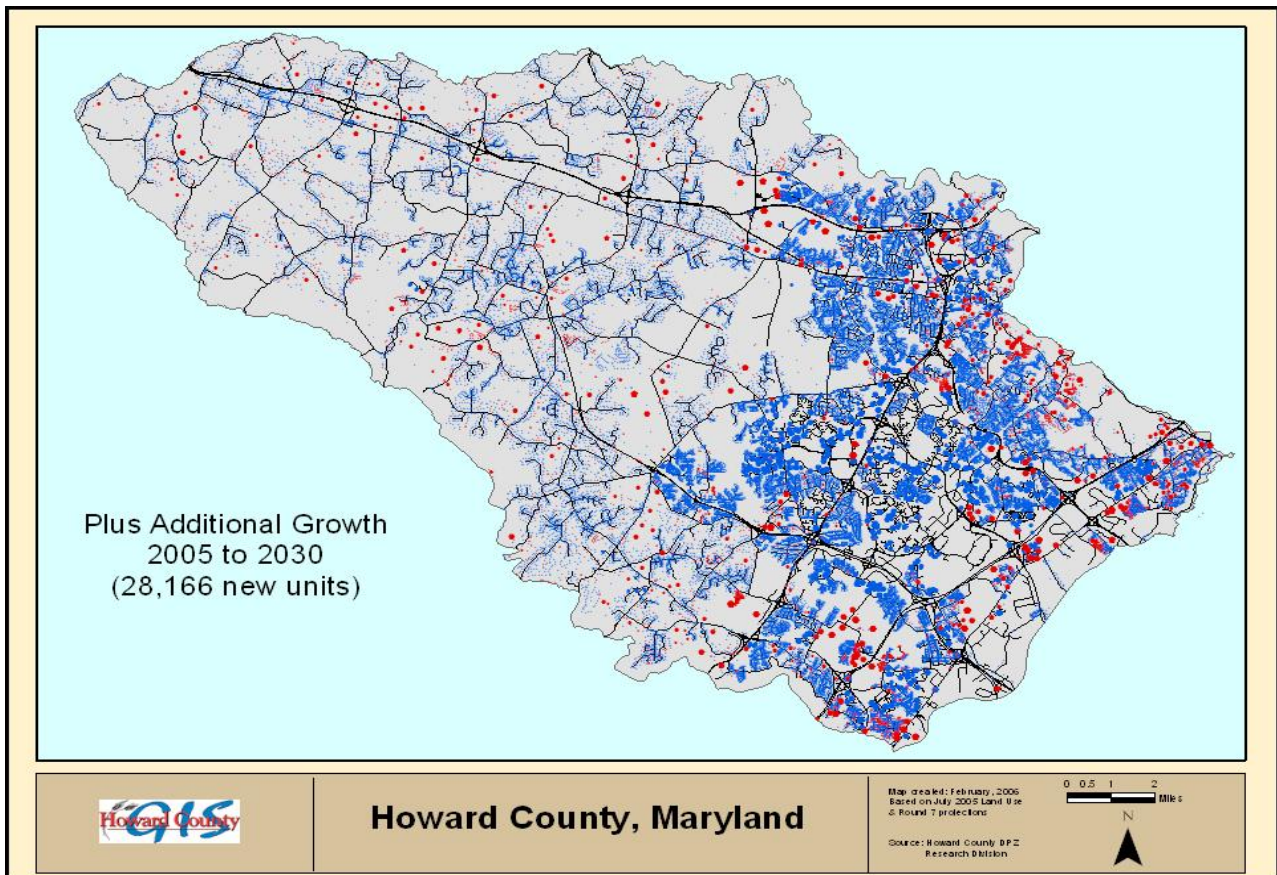
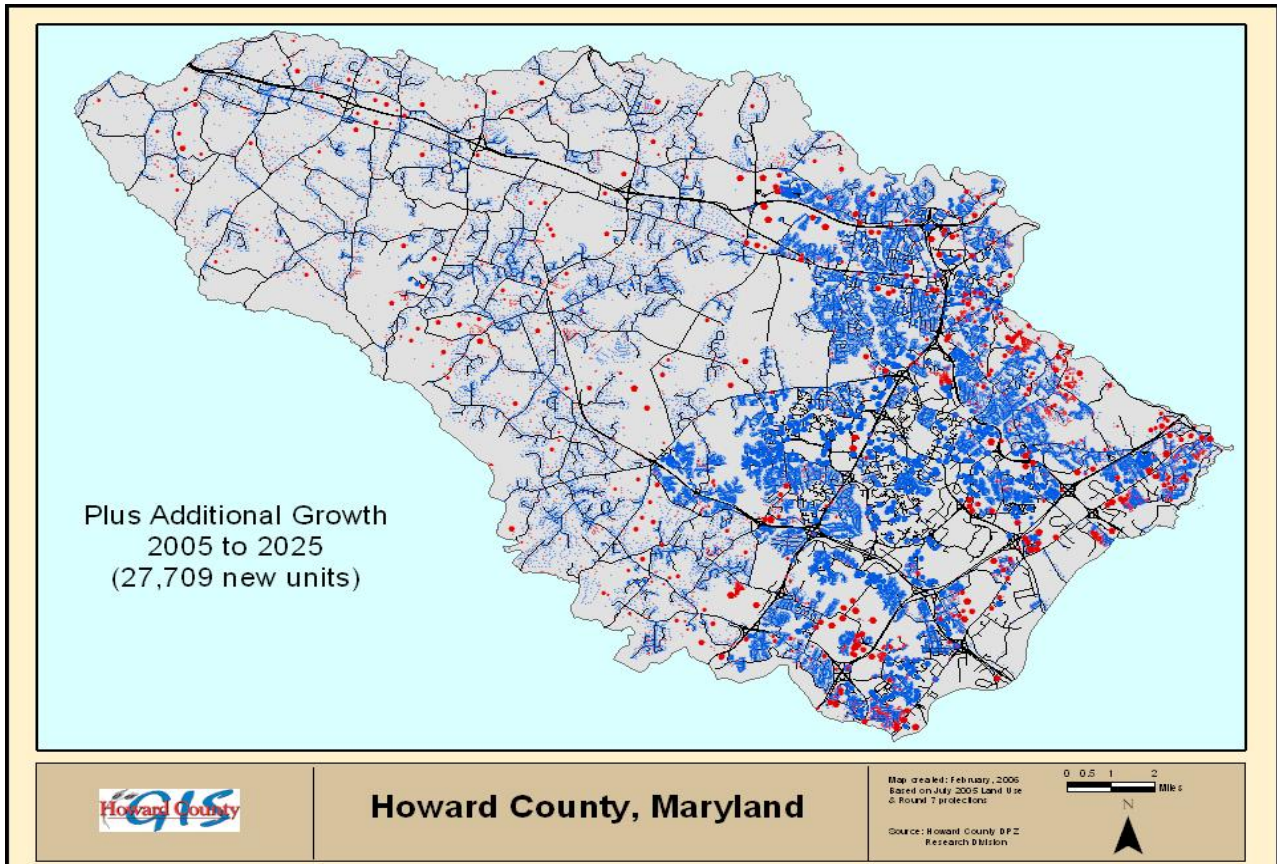
TAZ	2005-2010		2010-2015		2015-2020		2020-2025		2025-2030		2030-2035	
	Non-Retail	Retail	Non-Retail	Retail	Non-Retail	Retail	Non-Retail	Retail	Non-Retail	Retail	Non-Retail	Retail
1003	0	0	0	0	27	5	0	0	0	0	0	0
1004	144	67	0	0	0	0	0	0	0	0	0	0
1005	30	6	0	0	0	0	0	0	0	0	0	0
1006	13	13	0	0	0	0	0	0	0	0	0	0
1007	68	14	0	0	56	56	0	0	0	0	0	0
1008	0	0	0	0	50	10	0	0	0	0	0	0
1009	0	0	0	0	0	0	0	0	0	0	0	0
1010	33	7	60	12	546	109	234	47	0	0	0	0
1011	30	20	0	0	170	34	976	195	178	36	0	0
1012	5	0	0	0	0	0	0	0	0	0	0	0
1013	250	11	228	5	151	0	154	0	789	0	152	0
1014	340	313	720	160	0	0	0	0	0	0	0	0
1015	0	0	30	6	0	0	0	0	0	0	0	0
1016	0	0	0	0	0	0	0	0	0	0	0	0
1017	0	0	0	0	0	0	0	0	0	0	0	0
1018	0	0	0	0	0	0	0	0	0	0	0	0
1019	0	0	0	0	0	0	0	0	0	0	0	0
1020	0	0	0	0	0	0	0	0	0	0	0	0
1021	0	0	0	0	0	0	0	0	0	0	0	0
1022	0	0	0	0	0	0	0	0	0	0	0	0
1023	0	25	6	1	0	0	0	0	0	0	0	0
1024	0	0	0	0	0	0	0	0	0	0	0	0
1025	0	0	0	0	0	0	0	0	0	0	0	0
1026	79	16	0	0	197	39	0	0	0	0	0	0
1027	0	0	0	0	0	0	0	0	0	0	0	0
1028	12	2	0	0	172	34	0	0	0	0	0	0
1029	0	0	0	0	38	8	0	0	0	0	0	0
1030	46	21	88	18	0	0	0	0	0	0	0	0
1031	205	41	0	0	45	9	396	79	901	180	0	0
1032	0	0	0	0	0	0	0	0	0	0	0	0
1033	0	0	0	0	0	0	0	0	0	0	0	0
1034	0	0	0	0	0	0	0	0	0	0	0	0
1035	0	0	0	0	0	0	0	0	0	0	0	0
1036	0	0	0	0	0	0	0	0	0	0	0	0
1037	66	5	0	0	0	0	0	0	0	0	0	0
1038	163	33	69	14	0	0	120	24	0	0	0	0
1039	0	0	0	0	0	0	0	0	0	0	0	0
1040	6	2	0	0	31	7	0	0	0	0	0	0
1041	46	9	163	33	686	137	615	123	0	0	0	0
1042	0	0	0	0	0	0	0	0	0	0	0	0
1043	0	0	0	0	0	0	0	0	0	0	0	0
1044	80	16	0	0	515	103	505	101	0	0	0	0
1045	0	45	0	0	0	17	0	0	0	0	0	0
1046	0	0	0	0	0	0	0	0	0	0	0	0
.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.
.	.	.	.	.	.	.	.	.	.	.	.	.
1145	200	37	356	11	605	71	198	18	607	0	85	0
1146	0	0	102	0	632	40	23	0	31	0	0	0
1147	0	0	98	19	25	5	0	0	0	0	0	0
1148	0	0	0	0	0	0	0	0	0	0	0	0
1149	0	0	0	0	145	0	0	0	500	250	500	250
1150	0	0	0	0	0	0	186	37	0	0	0	0
1151	0	0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL</b>	<b>16,480</b>	<b>2,015</b>	<b>15,171</b>	<b>1,229</b>	<b>13,446</b>	<b>1,818</b>	<b>14,258</b>	<b>1,962</b>	<b>12,196</b>	<b>1,312</b>	<b>5,479</b>	<b>250</b>

## Exporting Model Results Back to GIS

Given the projections are done at the parcel and lot level, the data can be exported back into a GIS environment. In this way, maps can be produced that show existing and future development in the County. Development patterns and intensity can be viewed. Multiple scenarios can easily be generated to show the timing and location of development assuming various policies and control totals. The maps below show the latest outputs of existing and future residential development at five year increments to 2030.









## Conclusion

Overall, the development of this system has enabled vast improvements in the accuracy, timeliness, consistency and specificity of land use projections in Howard County. As indicated in the Introduction, the new system has three main advantages: 1) the ability to easily provide *consistent* projections based on the General Plan in *any geography* without a manual interpretation, 2) the ability to show current and projected land uses down to the parcel level, and 3) the ability to update the projections on a more regular basis using the latest development information. Other advantages include the ability to visually show future land use patterns and trends, generate up to date land use capacity estimates, and quickly run multiple projection scenarios for analysis testing.<sup>10</sup>

The importance of collaboration with other agencies, the ultimate users of the information, cannot be underestimated. In this case specifically, the projection component of the land use system was developed by a staff member of the Howard County Public School System to use as inputs to their student projection model. Once created, the model could easily be used by other agencies. With more users, more ideas for improvement are generated. For example, one current improvement underway for an updated version is to add a PERMIT stage to the other four stages of development that would track issued building permits. This will allow the tracking of units being constructed at any given time and a better determinant of which unbuilt lots will be completed and occupied in the immediate future.

As will any model – and there are a lot out there that do this type of thing – *the key is accurate and up to date data*. As indicated earlier, the land use database is maintained on a daily basis. Dedicated staff resources are necessary to understand and enter the latest development tracking information as well as to continuous quality control and improve the accuracy of the data.

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<sup>10</sup> For example, fiscal impact scenarios can be generated, as well as traffic, water/sewer, school and other infrastructure analyses. This will be a useful tool as part of the next General Plan to evaluate proposed changes, if any, to current land use policy.

# APPENDIX

## Land Use Database - January 2006 Number of Records - By Land Use Code Order

Land Use Code	Number of Records	Percent of Records	Detailed Description	Type	
10	4,477	6.91%	Undeveloped Residential	R E S I D E N T I A L	
11	46,736	72.16%	Single Family Dwelling		
12	319	0.49%	Two or More Family Dwelling		
13	2,056	3.17%	Attached Units		
14	100	0.15%	Attached Units (Condominium)		
15	126	0.19%	Apartments		
16	85	0.13%	Apartments (Condominium)		
17	23	0.04%	Mobile Home		
18	51	0.08%	Transient Lodging		
19	0	0.00%	Other Residential Not Elsewhere Classified		
20	265	0.41%	Undeveloped Commercial		C O M M E R C I A L
21	76	0.12%	Retail, Other		
21-	1	0.00%	Retail Master Record		
21-1	32	0.05%	Antique Shops, Craft Shops		
21-2	66	0.10%	Clothing and Apparel Stores		
21-3	48	0.07%	Commercial Greenhouses, Garden Centers, Nurseries, Florists		
21-4	41	0.06%	Department Stores, Furniture Stores, Appliance Stores		
21-5	20	0.03%	Drug and Cosmetic Stores		
21-6	0	0.00%	Farm Produce Stands		
21-7	166	0.26%	Food, Liquor Stores, General Store		
21-8	23	0.04%	Home Improvement Stores		
21-9	3	0.00%	Kennels		
21-10	6	0.01%	Lumber Yards		
21-11	3	0.00%	Mobile Home, Prefabricated Home, Camper Sales or Rental		
21-12	199	0.31%	Motor Vehicle and Construction or Farm Equipment Sales, Repair and Services		
21-13	324	0.50%	Specialty Stores		
21-14	70	0.11%	Gasoline Service Station		
22	173	0.27%	Service, Other	S E R V I C E	
22-	1	0.00%	Service Master Record		
22-3	770	1.19%	Office		
22-4	22	0.03%	Animal Hospitals		
22-5	93	0.14%	Banks and Similar Financial Institutions		
22-6	21	0.03%	Blue Printing, Printing, Duplicating, Engraving Services or Sign Shop		
22-7	19	0.03%	Bowling Alleys, Tennis Barns, and Similar Uses		
22-8	27	0.04%	Bldg Cleaning, Painting, Roofing, Exterminating, Plumbing, Electrical & Similar Est.		
22-10	4	0.01%	Funeral Homes		
22-11	6	0.01%	Furniture and Appliance Repair		
22-12	2	0.00%	Auditoriums, Stadiums, Trade Expositions		
22-13	66	0.10%	Laundry and Dry Cleaning Establishments		
22-15	5	0.01%	Theatres-Movie, Legitimate, Dinner, Drive-in		
22-16	0	0.00%	Museums, Art Galleries		
22-18	254	0.39%	Pers Serv Est, Barber, Beauty Shop, Optician, Physicians, Tailor, Shoe Repair, Photographer, Tanning Spa		
22-19	130	0.20%	Pers Serv Agency-Real Estate, Insurance, Security Service, Messenger Service, Computer, Travel, Video		
22-20	344	0.53%	Food & Beverage Consumption Establishments (i.e., Fast Foods, Restaurants)		
22-21	1	0.00%	Taxidermist		
22-22	11	0.02%	Research Laboratories		
22-23	3	0.00%	Amusement Park		
22-24	0	0.00%	Recreational Vehicle Courts		
22-25	0	0.00%	Race Track		
30	270	0.42%	Undeveloped Industrial	I N D U S T R I A L	
31	13	0.02%	Light Manufacturing, Other		
31-1	1	0.00%	Clothing and Apparel		
31-2	25	0.04%	Food & Drink Production, Processing, Packaging & Distribution		
31-3	12	0.02%	General Light Manufacturing		
31-4	5	0.01%	Home Goods, and Furniture Manufacture		
31-5	16	0.02%	Manufacture, Compounding, Assembling, Repair or Treatment of Articles or Merchandise		
31-6	7	0.01%	Printing, Lithography, Bookbinding, Publishing		
31-7	1	0.00%	Saw Mills		
31-8	17	0.03%	Parking Lots or Yards		
31-9	462	0.71%	Warehouses, Truck Terminals, Moving and Storage and Cold Storage		
31-10	39	0.06%	Wholesale Building Materials, Supplies, and Installation Contractors and Storage Yards		
31-13	28	0.04%	Wholesale Sales, Packaging and/or Distribution		

**Land Use Database - January 2006**  
**Number of Records - By Land Use Code Order**

Land Use Code	Number of Records	Percent of Records	Detailed Description	Type	
32	1	0.00%	Heavy Manufacturing, Other	INDUSTRIAL	
32-	1	0.00%	Master Heavy Manufacturing		
32-1	2	0.00%	Aircraft Manufacture or Assembly		
32-2	4	0.01%	Manufacturing & Bottling of Beverage, including Alcoholic Beverages		
32-3	2	0.00%	Asphalt or Asphalt Product Manufacture		
32-4	2	0.00%	Automobile or Truck Assembly Plants		
32-5	0	0.00%	Bone Distillation		
32-6	0	0.00%	Charcoal Manufacture		
32-7	0	0.00%	Clay Products Manufacture		
32-8	0	0.00%	Coal Products Manufacture		
32-9	0	0.00%	Coal Storage		
32-10	3	0.00%	Concrete Batching		
32-11	5	0.01%	Concrete Products Manufacture		
32-12	4	0.01%	Construction Machinery Manufacture & Repair		
32-13	0	0.00%	Cotton Mill, Cloth Manufacture		
32-14	0	0.00%	Disinfectants Manufacture		
32-15	0	0.00%	Electric Power or Steam Generating Plants		
32-16	0	0.00%	Excelsior Manufacture		
32-17	0	0.00%	Fertilizer Manufacture		
32-18	0	0.00%	Packing or Processing of Fish Products, Fruits or Vegetables		
32-19	0	0.00%	Foundries		
32-20	0	0.00%	Food Manufacturing, Packing or Processing Plants		
32-21	0	0.00%	Fungicides Manufacture		
32-22	0	0.00%	Tanning, Curing, Finishing or Dyeing of Fur		
32-23	2	0.00%	Garbage Incineration or Reduction		
32-24	1	0.00%	Gas Manufacture		
32-25	0	0.00%	Gelatin Manufacture		
32-26	0	0.00%	Glass Manufacture		
32-27	0	0.00%	Glue Manufacture		
32-28	0	0.00%	Grain Storage, Milling or Processing		
32-29	1	0.00%	Graphite and Graphite Products Manufacture		
32-30	0	0.00%	Bulk Processing, Washing, Curing or Dyeing of Hair		
32-31	0	0.00%	Ice Factory		
32-32	0	0.00%	Insecticides Manufacture		
32-35	0	0.00%	Linoleum Manufacture		
32-36	1	0.00%	Heavy Machinery Manufacture or Repair		
32-37	3	0.00%	Machine Shops, Including Manufacture of Precision Instruments		
32-38	0	0.00%	Matches Manufacture		
32-39	0	0.00%	Livestock Slaughtering or Preparation for Packing		
32-40	0	0.00%	Manufacturing of Metal Alloys or Foils		
32-41	0	0.00%	Monument Works, Open or Closed		
32-43	0	0.00%	Raw Plastics Manufacture		
32-44	0	0.00%	Porcelain Products Manufacture		
32-45	0	0.00%	Railroad Equipment, Manufacture, and Repair		
32-47	0	0.00%	Natural or Synthetic Rubber Processing or Manufacture		
32-48	0	0.00%	Salvage Storage		
32-49	0	0.00%	Scrap Metal, Paper, or Rag Storage		
32-50	0	0.00%	Size Manufacture		
32-51	0	0.00%	Soap or Detergent Manufacture		
32-52	0	0.00%	Solvent Extracting		
32-53	0	0.00%	Stockyards		
32-54	1	0.00%	Stone or Stone Products Manufacture		
32-55	0	0.00%	Tile Manufacture		
32-56	0	0.00%	Topsoil Manufacture		
32-57	0	0.00%	Turpentine Storage		
32-58	0	0.00%	Woodworking Plants		
32-59	0	0.00%	Wool Scouring or Pulling		
33	4	0.01%	Transportation, Communication and Utilities		TCU
33-1	60	0.09%	Railroad		
33-2	2	0.00%	Airfield		
33-3	2,119	3.27%	Parking Lots, Park & Ride Lots, Road, Freeway, R/W		
33-4	44	0.07%	Communications, Repeater Stations, Microwave Tower		
33-5	167	0.26%	Utilities, Powerline and Pipeline R/W, Substations		

**Land Use Database - January 2006**  
**Number of Records - By Land Use Code Order**

Land Use Code	Number of Records	Percent of Records	Detailed Description	Type
40	9	0.01%	Undeveloped Government & Institutional	G
41	0	0.00%	Government, (Local, State, Federal)	O
41-1	11	0.02%	Government Offices	V
41-2	3	0.00%	Police Station	G
41-3	15	0.02%	Fire Station	O
41-4	10	0.02%	Library	V
41-5	244	0.38%	Government Others (Identify)	&
41-6	21	0.03%	Post Office	I
42	5	0.01%	Schools, Public	N
42-	1	0.00%	Master Record Schools Public	S
42-1	42	0.06%	Elementary School	O
42-2	22	0.03%	Middle School	C
42-3	21	0.03%	High School	H
42-4	6	0.01%	College	O
42-5	1	0.00%	Educational Administrative Offices	O
43-1	90	0.14%	Schools, Private inc. Day Care	N
44	4	0.01%	Recreation	S
44-	0	0.00%	Recreation Master Record	L
44-1	1,777	2.74%	Park (County, State, WSSC), Open Space Dedicated to Howard County	S
44-2	513	0.79%	Columbia Open Space	T
44-3	961	1.48%	Playgrounds, Athletics Fields, Tennis Courts, Ice Rink, Floodplain, Open Space not dedicated to HC	P
44-4	11	0.02%	Community Center, Library	A
44-5	91	0.14%	Country and/or Private Clubs, Golf Courses, Golf Driving Ranges, Baseball, Batting Ranges, Private Pools	R
44-6	3	0.00%	Riding Academies and Stables	O
45	1	0.00%	Institutions	S
45-1	4	0.01%	Hospitals, Sanitariums	T
45-2	5	0.01%	Retreat Center	I
45-3	173	0.27%	Churches	O
45-4	80	0.12%	Cemeteries and Mausoleums	N
45-5	22	0.03%	Institutional Others (Identify)	S
45-6	4	0.01%	Convalescent Homes, Nursing Homes and Similar Establishments	&
51-1	0	0.00%	Farmland	I
51-2	0	0.00%	Woodland	N
61	2	0.00%	Miscellaneous (Other)	V
61-1	3	0.00%	Livestock Auction Markets and Fairgrounds	S
61-2	0	0.00%	Shooting Ranges	&
61-3	5	0.01%	Quarries	I
61-4	14	0.02%	Junk Yards	N
61-5	0	0.00%	Rendering Plants	S
<b>TOTAL</b>	<b>64,767</b>	<b>100%</b>		